



Comprehensive Transportation Plan for Jamestown 2007: Phase II

final report

prepared for

**Virginia Department of Rail and
Public Transportation**

prepared by

Cambridge Systematics, Inc.

with

**BRW, Inc.
KFH Group**

June 2003

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1.0 Recommendations

1.0 Recommendations

■ 1.1 Introduction

Jamestown 2007 is planned to be a collection of more than 100 events, major and small, that will commemorate the 400th Anniversary of the establishment of the first permanent English settlement in North America on the shores of the James River in 1607. These events are anticipated to take place between the fall of 2006 and the spring of 2008 across the Commonwealth of Virginia. The vast majority of these activities are likely to be relatively small in size and localized in scope. Most events that are planned to take place in the Historic Triangle (Jamestown-Williamsburg-Yorktown) area will likely create somewhat busier than average peak visitation levels. The following pages describe the actions required to serve the transportation and logistics needs of these events.

Major Events

Based on the most recent preliminary events schedule issued by the Jamestown-Yorktown Foundation in November 2002, it is presently anticipated that two or three “major” events will take place in the Historic Triangle during 2007. Clearly, all of the activities associated with “America’s Anniversary Weekend” during May 11 to 13, 2007, will need to be considered as “major” events.

These events are anticipated to attract approximately 30,000 spectators each to either Jamestown Island, managed cooperatively by the National Park Service (NPS) and the Association for the Preservation of Virginia Antiquities (APVA), or the nearby Jamestown Settlement, which is managed by the Commonwealth of Virginia’s Jamestown-Yorktown Foundation.

Other major planned events, such as the “Sail America” visit of the Tall Ships to Hampton Roads in June 2007, can be expected to generate extremely large crowds on the order of several hundred thousand persons, similar to those observed during the last Tall Ships visit to the region in the summer of 2000. However, given the immense size of the viewing venue (e.g., virtually the entire Hampton Roads shoreline), the concentration of crowds in any one area will probably be no more than 30,000 to 50,000 persons. Similarly, the planned NATO flotilla gathering of naval vessels in Hampton Roads during October 2007 will undoubtedly be classified as a “major” event, but should not directly impact venues in the Historic Triangle area.

Mid-Sized Events

Over the period from the spring of 2006 through the middle of 2008, there are likely to be at least six events at the Jamestown Settlement and nearby sites alone that would classify as “mid-sized” activities. These might include, but not be limited to:

- The unveiling of the commemorative plaza/monument at Jamestown Settlement in the fall of 2006;
- The African American event at a Jamestown site or another Virginia location in February or another month;
- The opening of the blockbuster exhibit “The World of 1607” at Jamestown Settlement in March 2007; and
- The Virginia Indian cultural and heritage event in November or another month.

Other activities, such as one or more of the stops on the replica ship tour of cities along the eastern seaboard during May to October 2006, the 225th Anniversary of the Battle of Yorktown in 2006, or the Society for Historical Archaeology Conference in Williamsburg in January 2007, can also be expected to represent “mid-sized” (or perhaps even “major”) events. As yet undefined functions in other Hampton Roads communities and elsewhere across the Commonwealth will also likely fall into the “mid-sized” event category.

This plan distinguishes between *major* events, which may attract 13,000 to 30,000 people, *mid-sized* events, which may attract 4,000 to 13,000 people, and *small* events, which may attract up to 4,000 people. The recommendations presented here provide order-of-magnitude estimates of the infrastructure and services required to serve the transportation demands generated by the commemorative events that are currently planned for 2007 to take place at the Island and the Settlement. These concepts can be used as the basis for more detailed operational studies, feasibility assessments, and cost estimates that will follow this study.

These recommendations are based on a review of existing traffic data, supplemented by capacity analyses of roadways leading to the venue areas. The recommendations are also based on the conservative assumption that the events will occur with a definite start and end time, which will create a peak-of-traffic demand approximately one hour before and one hour after most events. Our analysis indicates that the roadway system leading to the Island/Settlement area has sufficient capacity to accommodate an event attracting up to roughly 13,000 visitors, under existing patterns of automobile and transit use. In order to accommodate events attracting more than 4,000 visitors, however, additional parking near the commemorative sites must be provided, and a significant proportion of the visitors must use tour buses and shuttle buses to arrive at the commemorative venues. Events attracting more than 13,000 visitors will require more aggressive measures to avoid significant delays to visitors arriving and departing the site.

The actions recommended here are intended to ensure that visitors to the Historic Triangle area in 2007 enjoy their stays and have memorable experiences. The quadricentennial commemoration, Jamestown 2007, offers an opportunity to leave a lasting impression of the greater Jamestown area as a “must-visit” attraction and strengthen the region’s position as one of the premier tourist destinations in the nation. It also presents a unique opportunity to establish a legacy of good planning and travel demand management.

Background

The recommendations presented in this plan reflect careful consideration of the opportunities and challenges presented by the existing transportation system. These issues and opportunities are described below.

Highway Capacity

In general, there appears to be ample highway access leading to the Historic Triangle area. Several parallel routes such as I-64 and U.S. 60 follow the northwest-southeast orientation of the peninsula. Additional regional access routes include U.S. 17, U.S. 258, and U.S. 460. Within the immediate area, SR 199 and the Colonial Parkway are partially access-controlled and provide the fastest access to points south beyond Williamsburg.

However, access to Jamestown Island itself and the nearby Jamestown Settlement is limited to only a few two-lane roadways – SR 5, SR 31, and the Colonial Parkway. No significant roadway capacity improvements are currently planned for these facilities. Moreover, there is not enough time to undertake the detailed planning, design, environmental analyses, capital programming, right-of-way acquisition, and construction that would be necessary to upgrade these access routes prior to 2007. And while intersection improvements are planned for the intersection of SR 199 and SR 31, peak-hour congestion is likely to remain an issue simply because of regional background traffic growth.

Limited-Venue Parking Capacity

Both Jamestown Settlement and the Jamestown Island Visitor Center plan to reconfigure and augment their existing parking facilities over the next four years. However, even with these improvements, it is expected that a total of only about 1,200 permanent and temporary automobile parking spaces may be available at these locations in 2007. This is a small fraction of the approximately 10,000 parking spaces that would be needed to accommodate a 30,000-person event, if an average of three persons per vehicle were assumed for those persons projected to arrive by automobile.

There is an inadequate supply of on-site parking to accommodate the projected demands of a major event if even a sizable minority of visitors arrives by automobile. In order to accommodate the transportation demands of any major event, it will be necessary to intercept the vast majority of arriving visitors some distance from the event venues and

accommodate their access to Jamestown Island and/or Jamestown Settlement by some form of public transportation service.

Based on currently available information about parking resources at the Island/Settlement, enough parking is available to accommodate most of the automobile demand generated by events attracting up to 4,000 visitors at any one time. Events attracting more than 4,000 persons will require the use of additional parking spaces in the area. Public and privately owned vacant and redevelopable parcels in the immediate vicinity of the event areas, if available for use, could supply the additional land required. Alternatively, a reduced version of the remote parking and shuttle bus services required to accommodate major events at these venues could be employed.

Separation of Local and Visitor Traffic

The surface street system in the city of Williamsburg, especially along routes leading to or from the Colonial Williamsburg area, is difficult to negotiate for visitors new to the area. Short city blocks with many decision points, confusing/inadequate signage on curvilinear arterial streets, and high numbers of pedestrian/vehicle conflicts in the core area all contribute to this difficulty. In order to maximize safety, and reduce congestion for local traffic during the peak-event periods, reducing visitors' reliance on auto travel for internal circulation is highly desirable. For these same reasons, intercepting visitor traffic as soon as possible once it has arrived in the Historic Triangle area will reduce traffic congestion and travel confusion.

The recommendations in this plan reflect the following objectives:

1. Minimize the congestion impacts of the anticipated events on the regional highway system;
2. Maximize the convenience, safety, and reliability of alternative transportation services for a relaxed and pleasurable visitor experience; and
3. Minimize impacts to the local community by physically separating visitor from local traffic as much as possible.

■ **1.2 Description of Transportation Plan Elements**

The following pages describe the principal elements of the recommended Jamestown 2007 Transportation Plan. Section 1.3 presents the organizational and management recommendations associated with the implementation of the transportation plan, while Section 1.4 presents preliminary cost estimates of the transportation plan elements. Finally, Section 1.5 presents an outline of the next steps required in the detailed event and venue planning process.

The recommended transportation plan consists of the following basic elements:

- Highway Improvements;
- Park-and-Ride Facilities;
- Local Transit and Ferry Services; and
- Intercity Transit Services.

Transportation recommendations for the yearlong commemoration are described first, followed by recommendations for major, mid-sized, and small events. Major events are described as those attracting between 13,000 and 30,000 visitors, mid-sized events between 4,000 and 13,000 visitors, and small events are those attracting fewer than 4,000 visitors.

Recommendations – Background Transportation System

Highway Recommendations

The highway recommendations are relatively modest, and do not anticipate that any significant roadway capacity improvements beyond those currently programmed to be implemented by 2006 will be available to support the Jamestown 2007 commemorative activities.

I-64

Current plans by VDOT propose the widening of I-64 over the next three to four years from two lanes in each direction to four lanes in each direction from U.S. 17 in Newport News south to Hampton and beyond. A second section in Newport News, between Jefferson Boulevard and U.S. 17, will be widened to three lanes in each direction by 2007. Conversely, no widening is currently programmed for I-64 from Richmond south into James City County by 2007. A still-unresolved design issue for the portions of I-64 to the north and south of Williamsburg is the debate over the potential use of the median area for the construction of the additional travel lanes. With respect to I-64, the Jamestown 2007 Transportation Plan recommends the following actions:

- If construction is ongoing by 2007, remove all barriers and construction equipment, and halt construction operations to eliminate safety hazards and unnecessary capacity restrictions on I-64.
- Complete the implementation of the intelligent transportation systems (ITS) components for the I-64 corridor as planned, from SR 199 south, covering the north and south ends of the peninsula. The ITS initiative includes the implementation of dynamic message signs, video surveillance, highway advisory radio, and the deployment of rapid response crews for accidents and incidents.

- Continue with detailed planning and design studies for the widening of the section of I-64 from the Williamsburg area north to I-295 in Richmond, but do not initiate construction in this area until after 2007. Given the likelihood of significantly increased visitation to the area in 2007, the presence of major construction activities could contribute to congestion and delay in the corridor.

U.S. 17 and U.S. 60

Relatively modest improvements to these corridors are anticipated over the next four years. For the most part, these proposals consist of intersection upgrades in the city of Williamsburg and adjacent areas of James City and York counties. These improvements should be implemented with all deliberate speed to ensure that construction is completed prior to 2007.

SR 199

SR 199 is an integral component of the Jamestown 2007 transportation system. For this system, the roadway functions as a bypass route around downtown Williamsburg that can facilitate the separation of local and visitor traffic. Current plans call for the completion of the SR 199 expansion to a four-lane facility from east of the SR 31 intersection to the U.S. 60 interchange area, and at-grade intersection improvements to the SR 199/SR 31 intersection by 2007. VDOT has contracted with a consortium of contractors, called the Jamestown 2007 Corridor Constructors, to design and build these improvements.

The Jamestown 2007 Transportation Plan recommendations for SR 199 are as follows:

- Monitor progress on the programmed roadway widening of SR 199 and the SR 31/SR 199 intersection improvement.

SR 359

SR 359 is the local street connecting SR 31 and the Jamestown Settlement with the Colonial Parkway and is a critical link for auto and bus access to the Island and Settlement. The road is scheduled to be relocated away from the entrance to the Settlement in order to reduce potential vehicular/pedestrian conflicts and to facilitate improved access to the Settlement's expanded parking lot. This project will be constructed by the Jamestown 2007 Corridor Constructors as part of the same contract funding the SR 199 improvements.

The Jamestown 2007 Transportation Plan recommendations for SR 359 are as follows:

- Monitor progress on the programmed relocation of SR 359.
- Ensure adequate access for shuttle bus operations between SR 359 and the Jamestown Settlement.

Transit Recommendations

The Jamestown-Yorktown Foundation anticipates nearly a doubling in the number of visitors who currently visit the Jamestown Settlement in 2007. There should be a higher than average level of visitation to all attractions in the Historic Triangle by 2007, and transit services should be increased to meet this demand.

Jamestown 400th Shuttle System

It is anticipated that there will be approximately 1,200 permanent and temporary automobile parking spaces distributed across Jamestown Island, Neck of Land, the Jamestown Island Glass House, and the Jamestown Settlement for 2007. In order to use these resources most efficiently, shuttle buses transporting visitors from their parking spaces to event venues will be necessary. The number, routing, and type of vehicles needed for the shuttle operations can be ascertained once parking designs for the Island and Settlement are finalized.

Colonial Parkway Shuttle

The Colonial Parkway shuttle would serve visitors at Colonial Williamsburg properties, and operate along the Parkway between Williamsburg, the Settlement, and Jamestown Island. Two or three permanent shuttles could provide adequate support for the generally higher levels of “everyday” visitation anticipated for 2007. The Jamestown-Yorktown Shuttle is mentioned in both the James City County Long-Range Transit Plan and the NPS Alternative Transportation System (ATS) Plan. While the county plan recommends a total of three buses in operation by 2007, the ATS plan calls for seven buses, operating at up to 15-minute frequencies. Seven buses should suffice for the accommodation of both increased background visitation conditions and small events.

U.S. 60 Shuttles

The James City County Long-Range Transit Plan calls for the local transit operator to operate two separate routes along U.S. 60 by FY 2003, one each on the north and south ends. Between one and four buses would be operated in peak service at 15-minute frequencies. These buses would serve visitors staying at one of the hotels along this corridor, providing connections to the Parkway shuttle via a transfer at the Colonial Williamsburg Visitor Center. An additional bus for each route would provide more capacity for the background influx of visitors anticipated in 2007 by increasing frequencies to 10 minutes or less during periods of peak demand, and provide bus operators with more flexibility to respond to unanticipated demands in that corridor or other corridors.

Williamsburg Transportation Center Shuttle

This service would serve visitors for charter buses and event-day train service arriving at the City of Williamsburg Transportation Center. The frequency of service would conform to the bus and train arrival and departure schedule. This service would provide a direct, smooth connection between the intercity travel modes and the shuttle service. Under current assumptions, it is estimated that about five buses would be required for this service.

It is currently anticipated that existing resources will suffice to meet background service needs.

Bus Management and Operation

In 2002, a new transit authority with consolidated services called Williamsburg Area Transport was created to serve the growing mobility needs of the Historic Triangle area. This new entity would be a logical source of coordination for planning and operating bus service for Jamestown 2007.

Hampton Roads Transit (HRT) is the largest transit provider in the tidewater region. They have operated shuttle bus services for special events throughout the peninsula area for many years. During OpSail 2000, for example, HRT provided management and operations manpower for all of the shuttle bus services operating out of the park-and-ride lot locations throughout the five-city area. Their presence in the planning, management, and operation of peak-event bus services for Jamestown 2007 would be a significant asset to the effort. Close coordination with Williamsburg Area Transport and Colonial Williamsburg, the two principal transit providers in the Williamsburg area, will be essential as well.

Automated bus dispatching and routing systems are on the horizon of the most forward-thinking transit systems in the world. Such systems, which have been implemented in Europe, promise a truly seamless, customer-focused transit system. These systems allow travelers to reserve a trip via computer with a single fare at a guaranteed time, much like a taxi trip, regardless of the number of transfers or transit agencies involved. Visitor travel is an ideal market for such a demand-responsive system. Williamsburg Area Transport and HRT might consider initiating a study to assess the feasibility of such a system in advance of 2007.

Bus Maintenance

Colonial Williamsburg will have a new bus maintenance facility in place by 2007. This facility could be used to service Jamestown 2007 buses during the peak-demand periods as well as other local service and intercity tour buses throughout the year.

- Consider leasing maintenance facility space and maintenance staff to service buses for Jamestown 2007 major events.

Fares

In order to maximize convenience and efficiency, no bus fares should be collected on board for peak-event bus services. If the appropriate level of sponsorship, and possibly Federal sponsorship, can be secured, providing these services free of charge would maximize ridership. If fares must be collected, bus pass sales kiosks should be established at convenient locations. Each bus pass sold would be good for unlimited rides for a period of at least one day, with multiple-day use options also available. Alternatively, the price of a ticket could simply be incorporated into the cost of a daily or weekend pass.

Ferry Service

VDOT operates regularly scheduled passenger and vehicle ferry service in the SR 31 corridor across the James River between Scotland in Surry County and Jamestown. According to VDOT staff, up to four ferries can be operated simultaneously, with an effective frequency of 15 minutes.

The Jamestown 2007 Transportation Plan recommends that this maximum potential level of service be operated during peak events. It is further recommended that an expanded park-and-ride facility be implemented in the SR 31 corridor between the town of Surry and the ferry landing at Scotland. During peak periods of demand, visitors will board shuttle buses that would transport them via the ferry to the Jamestown landing, and then drop them off at either the Settlement or Jamestown Island. This service should remain free of charge as it is currently.

Parking

Colonial Williamsburg Visitor Center. The visitors' center parking lot at Colonial Williamsburg should be a transfer point for bus travel to Jamestown and Yorktown. This lot and the attendant Colonial Williamsburg Visitor Center, which is being expanded and reconfigured as part of a larger expansion effort by Colonial Williamsburg, will ultimately provide parking space for approximately 80 tour buses and 2,000 automobiles. The use of this lot as a park-and-ride/transfer point will provide the opportunity to operate a direct transit service connection between the two most popular visitor destinations in the Historic Triangle during the commemorative period. This facility will also be able to serve regional traffic that has not been intercepted at the I-64/SR 199 park-and-ride lots north and south of Williamsburg.

- Coordinate closely with Colonial Williamsburg to establish their willingness to assist in the provision of parking to serve mid-sized and major events for Jamestown 2007.

Parking for Local Residents. This plan recommends the establishment of several park-and-ride lots to serve visitors from outside the region, as well as local residents. Other locations conveniently accessible to the recommended shuttle services may be available as well, such as parking at commercial centers and public parks near SR 199.

- Establish convenient park-and-ride locations for local residents.

Bicycle Element

Biking is considered one of the many recreational pursuits to enjoy in the Historic Triangle and is a viable mode of transportation for William and Mary students and other local residents. This plan recommends the completion of several critical links in the regional bike-way system plan:

- Complete the Capitol to Capitol bikeway segment along the SR 5 corridor, from the James River to Jamestown;

- Complete the Ironbound Road bikeway from Mid County Park to Clara Byrd Baker Elementary School; and
- Complete the Ironbound Road/Sandy Bay Road bikeway, from the Clara Byrd Baker Elementary School to SR 31 (Jamestown Road).

Traveler Information

An important element of the overall visitor transportation plan for Jamestown 2007 is the provision of traveler information. A well-conceived traveler information “system” will provide clear, unified, and unambiguous information on available travel options before the trip is made and available route and modal options while travelers are en-route. This is an indispensable component of a pleasurable visitor “experience.”

The Hampton Roads Smart Traffic Center uses a variety of video cameras and pavement sensors to monitor traffic speed and volume and to identify the location of accidents and other incidents resulting in congestion. The Hampton Roads regional Traffic Management System (TMS) is continuing to expand its area of coverage onto the peninsula, with additional static and variable message signs to be placed along the I-64 corridor over the next three to five years. The current highway advisory radio message system will also be expanded in coming years.

Visitors’ travel choices can be influenced before they depart for the Historic Triangle area, via radio, television, and the Internet. Once in the Historic Triangle, visitors can be informed of available transit services and parking resources.

- Install permanent and temporary variable message signs as appropriate to guide visitors to commemorative venues through routes least likely to adversely impact the local community and create unacceptable levels of congestion.
- Inform visitors of their travel options, and about travel restrictions and recommended routes, through an information campaign, using electronic and other media. This should include a single source of web-based information for travel to and around the Jamestown area.
- Develop a traveler information plan, detailing how visitors will receive information about travel options before they depart for their visits to the Historic Triangle, and detailing how they will receive information once they arrive in the area.

Recommendations – Major Events

Major events attracting between 13,000 and 30,000 (or more) people will place significant demands on the transportation system. There is insufficient highway and on-site parking capacity to allow all visitors to arrive by automobile at the Jamestown Settlement and Jamestown Island venues. The principal recommendations for major events are to:

1. Restrict auto access to the Island/Settlement;
2. Establish a system of hotel shuttle buses and intercept park-and-ride services to transport visitors to the venue locations; and
3. Establish regional intercept park-and-ride lots linked to Jamestown Island and the Jamestown Settlement by a group of high-frequency shuttle bus services.

Figure 1.1 depicts the principal transportation recommendations to accommodate the visitor travel demands associated with major events at Jamestown Island and the Jamestown Settlement. As shown on Figure 1.1, these proposed transportation elements are very similar in general concept to the successful visitor transportation program operated during the OpSail 2000 visit to the Hampton Roads region in June 2000.

Colonial Parkway

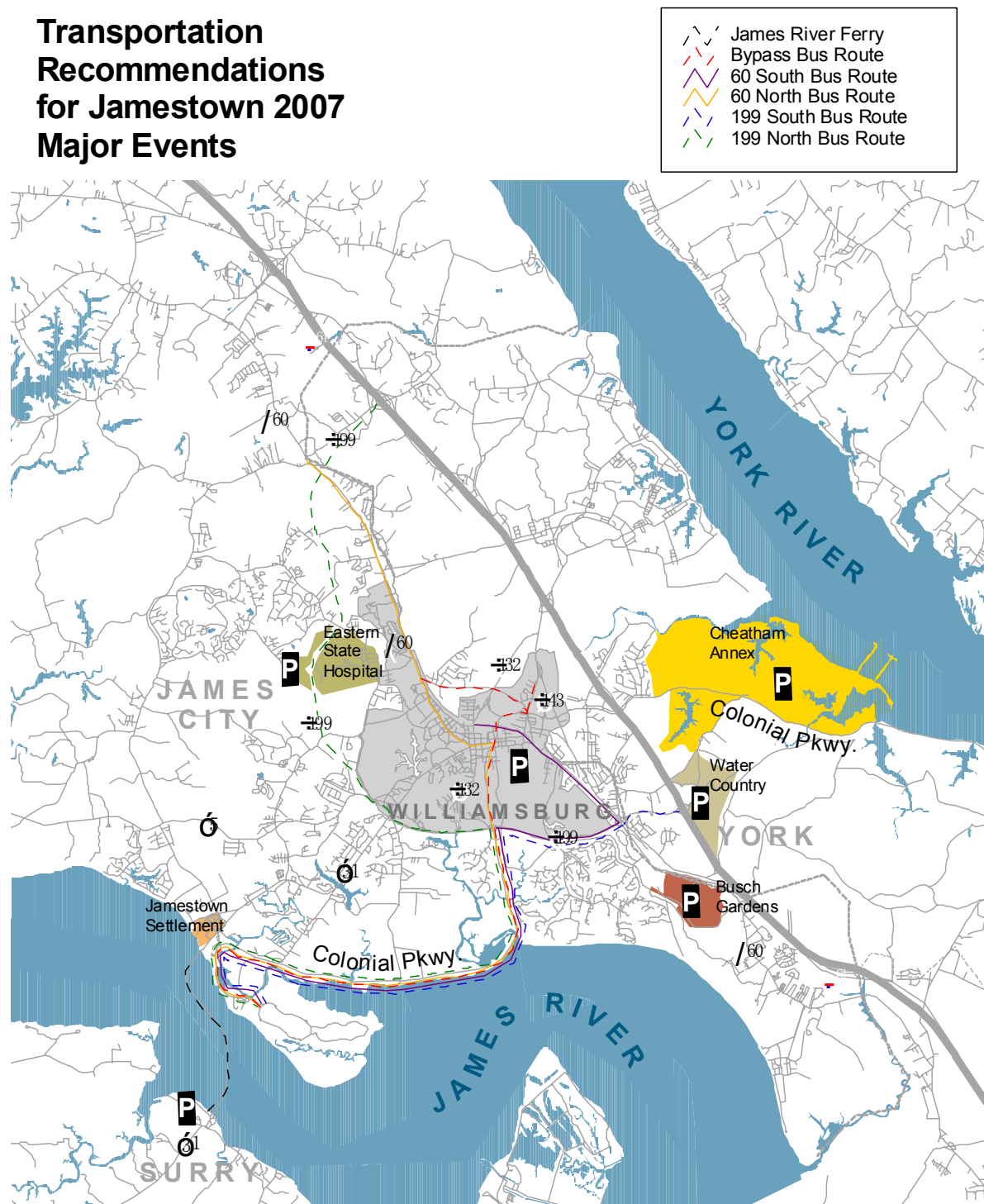
The Jamestown 2007 Transportation Plan recommends dedicating Colonial Parkway as a **bus-only** facility during the major events at Jamestown Island and the Jamestown Settlement. This will minimize potential conflicts between automobile and bus movements, and maximize the efficient operation of the shuttle bus services. This recommendation will require the consent of the NPS for this designation, and a detailed operational analysis for implementation.

Parking

This plan proposes the establishment of several large, temporary parking lots near each of the SR 199/I-64 interchanges. Under current assumptions for a 30,000-person attendance major event, there appears to be sufficient demand for approximately 2,000 parking spaces at each location. It is anticipated that the majority of the visitors not using the intercept park-and-ride lots would depart from hotels in the vicinity, or use the Colonial Parkway shuttle from Colonial Williamsburg Visitor Center.

SR 199/I-64 North. There is a reasonable possibility that unpaved land at Eastern State Hospital can be used for temporary shuttle bus parking. We estimate that the site contains roughly 3,000 parking spaces. Access to the site, which is located near the SR 199/Longhill Connector Road interchange, will need to be carefully managed to prevent bus/auto conflicts. There is also an existing VDOT-operated park-and-ride lot near the SR 199/U.S. 60 interchange, which can accommodate approximately 100 vehicles. Other opportunities should be explored as well, such as the use of existing lots on commercial developments in the area or the Bruton High School property near the I-64/SR 199 interchange, the District Sports Complex near Longhill Road, and the York River State Park.

Figure 1.1 Transportation Recommendations for Major Events



SR 199/I-64 South. The property managers at Busch Gardens/Water Country have indicated that they could make some of their existing parking lots available for use as temporary remote park-and-ride spaces for 2007. These sites are ideally situated. Water Country is directly accessible from I-64, Exit 238 from SR 199/Penniman Road. Busch Garden's Scotland lot is located just west of the main parking lot on U.S. 60, and is accessible from I-64 at Exit 243. Potentially, 500 parking spaces could be made available for a May 13, 2007, event and 2,000 spaces made available for an October event from the parking lot at Water Country USA. For the May 13th event, Busch Gardens could potentially make available at least 1,000 parking spaces from the Scotland lot and possibly more, depending on Busch Gardens' own projected parking needs as the event approaches.

The Cheatham Annex of the U.S. Navy's Yorktown Weapons Station is a naval supply center located on the York River, near the south (eastern) I-64/SR 199 interchange. The Navy would like to participate in Jamestown 2007 commemorative activities and further has indicated that the Cheatham Annex area could be a viable location for Jamestown 2007 park-and-ride use. A large surplus warehouse at the Annex is scheduled for demolition within the next three years. This cleared, flat, open area could provide enough parking for approximately 1,400 spaces in 2007. Moreover, the area is near the main entrance to the Annex with direct connections to the Colonial Parkway and is accessible from an adjacent service road. This would allow for the separation of automobiles and buses as they enter and leave the parking area.

Jamestown Settlement/Jamestown Island. This plan further recommends *limiting automobile parking to VIP and emergency vehicles at the Settlement and on Jamestown Island during peak events*. This will help to minimize roadway congestion and ensure the most efficient use of available roadway capacity through effectively dedicating the roadway space to bus service.

Transit Services

This plan recommends a system of shuttle buses and park-and-ride buses to serve the peak-event demands in May and October 2007. These services would operate at high frequencies during the three hours leading up to and following the events, and at reduced frequencies during off-peak periods. All buses in this plan would operate as express buses on the Colonial Parkway after picking up their passengers. These routes are designed so that passengers reach the Settlement and Island as conveniently as possible, requiring no transfers and a minimum of walking and waiting time.

Initial bus loading and unloading designs for the Island and the Settlement have been completed and continue to be refined. The initial venue access plan has suggested locating the Settlement pick-up/drop-off bays on the Colonial Parkway just south of the intersection with SR 359. This design is being reviewed, and the potential for placing the bus staging area in the reconfigured Settlement parking lot rather than on the Parkway is being explored at this time as well.

The individual elements of the shuttle bus system plan are as follows:

Williamsburg Area Hotel Shuttles

The three hotel corridor shuttles would operate as a “super” relax-and-ride service during major events. Regularly scheduled service would operate in the off-peak hours.

- *U.S. 60 North.* This shuttle would operate from Williamsburg Pottery to Jamestown via U.S. 60 and the Colonial Parkway. Roughly 45 buses would circulate on this route in the peak hours. This service would serve approximately 3,000 hotel rooms along this corridor.
- *U.S. 60 South.* This shuttle would operate from the vicinity of the SR 31/Lafayette Street intersection to Kingsmill and the Colonial Parkway. Based on current assumptions, 40 buses would circulate on this route in the peak hour. This service would serve approximately 2,200 hotel rooms along this corridor.
- *Bypass Road.* This shuttle would circulate between Capital Landing Road and Merrimac Trail to the Colonial Parkway, and serve approximately 2,900 hotel rooms. The total number of buses needed for this route under current assumptions is 40.

Scotland Ferry Shuttle

- For major events, buses would collect visitors at a park-and-ride lot near the county government building in the town of Surry and board the Scotland ferry to transport visitors across the James River from Surry County to either the Settlement or the Island. The four ferries that will be in service by 2007 will be capable of carrying six buses each. Twenty-four buses plus an additional six that are required to maintain a 15-minute service frequency, for a total of 30 buses, would be needed to operate this service.

Park-and-Ride Shuttle

- Two express bus routes would operate from the proposed park-and-ride lots to be located at the north and south interchanges of SR 199 and I-64. These buses would carry their passengers in closed-door service from SR 199 to the Colonial Parkway, and then via the Parkway to the Settlement and Jamestown Island. Under current assumptions, the northern and southern routes would require approximately 30 and 40 buses, respectively.

Regional Bus Services

- Privately operated regional express shuttle bus service could provide convenient connections between the Richmond and Norfolk areas and the Historic Triangle area. These buses would make connections with the park-and-ride shuttles, and operate at moderate to high frequencies in the peak hour. These buses would serve residents as well as large groups of visitors, such as the National Association of County Officials, which has already made hotel reservations in Richmond for 2007. This plan assumes that buses chartered through private companies would provide this service.

Regional Train Services

- Chartered rail service contracted through Amtrak or the Virginia Railway Express could provide additional service between the Washington-Richmond and Richmond-Newport News corridors. For the major events, hourly round-trip service would provide an adequate level of service. The tracks between Washington and Williamsburg, and beyond to Newport News, are shared by Amtrak and CSX freight operations. In order to attain higher service frequencies for passenger service, some CSX freight service may require rescheduling.

Summary of Major Event Vehicle Requirements

Table 1.1 presents a summary of the peak vehicle requirements associated with the recommended Jamestown 2007 major event transit services.

Table 1.1 Vehicle Requirements – Jamestown 2007 Peak-Event Bus System Transit Routes (30,000-person event)

Route	Description	No. of Buses
Hotel Corridor North	Direct service from northern end of U.S. 60 north to Jamestown Island via Colonial Parkway	44
Hotel Corridor South	Direct service from southern end of U.S. 60 corridor to Jamestown Island via Colonial Parkway	40
Hotel Corridor Bypass Road	Direct service from Bypass Road corridor to Jamestown Island via Colonial Parkway	40
SR 199 Connector North	Direct service to Jamestown Island from temporary park-and-ride lot near SR 199/I-64 interchange	30
SR 199 Connector South	Direct service to Jamestown Island from temporary park-and-ride lot near SR 199/I-64 interchange	40
Colonial Williamsburg-Jamestown Connector	Colonial Williamsburg to Jamestown Island	10
Scotland Ferry Shuttle	Surry County park-and-ride lot to Jamestown Settlement/Island via Scotland Ferry	30
Transportation Center Shuttle	City of Williamsburg Transportation to Jamestown Island and Jamestown Settlement	10
Total Peak-Hour Vehicle Requirement		244

Bus Procurement

Given the assumption that 95 percent of all major event visitors will need to be transported by bus, it is estimated that up to 250 buses may be required to accommodate the

peak hourly demand at the major Jamestown 2007 events. Our preliminary survey of regional transit resources in the corridor between Richmond and Hampton Roads indicates that a sufficient number of buses should be available for leasing from local public and private sources if mutually acceptable terms on bus leasing can be crafted. However, this conclusion that sufficient resources should be available is predicated upon the assumption that all peak events will take place on weekends when normal bus services are curtailed and maximum spare capacity is available. If any major events are scheduled during weekdays in the spring or fall months, it may be very difficult, if not impossible, to obtain the required number of buses from the adjacent region.

Passenger Rail Service

HRT has recently completed a Major Investment Study (MIS) for the CSX rail corridor from Newport News to Williamsburg, and will shortly be initiating a formal preliminary engineering/draft environmental impact statement (PE/DEIS) study of this corridor.

The Jamestown 2007 Transportation Plan supports the CSX corridor study and the concept of providing passenger rail service between the Newport News area of Hampton Roads and Williamsburg. It is unlikely that this study and the subsequent preliminary engineering, final design, construction, and capital procurement, activities could be completed in time for a light rail transit line to serve Jamestown 2007.

Expanded intercity passenger rail service along *existing rail lines* should be included in the overall transit service plan for 2007. This service should include:

- Increased frequencies on the Washington to Richmond service;
- Increased frequencies for service from Richmond to Williamsburg; and
- Increased service frequency for rail service from Newport News to Williamsburg.

Initial consultation with CSX should commence to ascertain the feasibility of providing an increased frequency of passenger service in the Richmond-Newport News corridor. The initial contacts with Amtrak should continue to ascertain costs and potential levels of service.

Description of Transportation Plan Elements – Mid-Sized Events

Events attracting between 4,000 and 13,000 persons may not require the high degree of transit service nor the proscription against auto access to the Island and Settlement required of major events. Demands on the highway system leading to the event venues and parking demands will be considerably less. The plan for mid-sized events retains ample transit services, but anticipates that some or most visitors will arrive by automobile.

The mid-sized events are likely to occur during all times of the year. Therefore, the recommendations for mid-sized events recognize that if events occur on weekdays or during the school year, fewer public agency buses will be available for leasing. The events are also equally likely to be planned as “peak” events with a definite start and end point as

they are to be a continuous set of activities spread throughout the day. These recommendations assume that a “peak” event will create the greatest transportation system demands just before and after the event takes place.

To serve the transportation needs of a mid-sized event, this plan recommends:

1. The development of additional temporary parking spaces near the Island/Settlement area;
2. A traveler information “system” that guides visitors to the Island away from the SR 31/SR 199 intersection; and
3. A local and regional shuttle bus system operating at low to moderate frequencies.

These recommendations are shown in Figure 1.2 and are described below. For clarity, the shuttle buses depicted in the major event figure are not included, but are recommended as part of the plan.

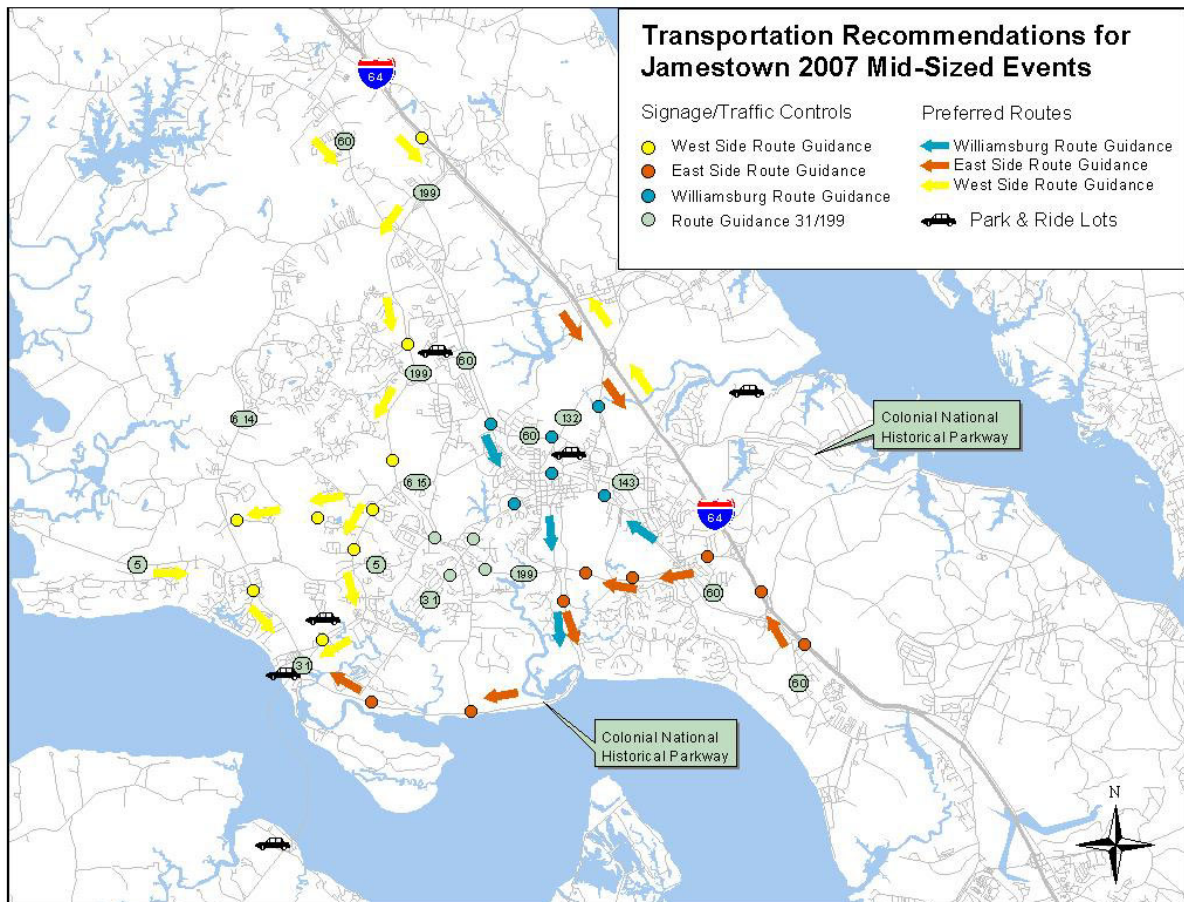
Highway Recommendations

Auto access to the Island and Settlement for mid-sized events can be accomplished through careful management of vehicular circulation in the area. One objective of these highway recommendations is to limit the congestion impacts of these events to Jamestown Road and the Jamestown Road/SR 199 intersection. This requires the deployment of a traveler information “system” to encourage visitors to use designated alternative routes. The degree of “management” required depends on the size of the event. Events at the smaller end of the (mid-sized) spectrum will not require the routing of all traffic away from Jamestown Road, while traffic for major events should be managed more aggressively.

The preferred alternative routes are:

- Guide eastbound visitors on I-64 to exit at SR 199, and proceed to the Monticello Avenue interchange. After exiting at westbound Monticello Avenue, visitors would be directed to Greensprings Road via a short segment of SR 5 or to Jamestown Road (SR 31) via Ironbound Road (SR 615) and Sandy Bay Road (SR 681). The Sandy Bay Road route may be preferable to the Monticello/Greensprings Road route because it is more direct and presents fewer potential traffic conflicts for travelers.
- Guide eastbound visitors on SR 5 to Greensprings Road and the additional parking facilities located on public or private property near the event venues.
- Direct westbound visitors on I-64 to the Island/Settlement area via the SR 199 east interchange, and the Colonial National Historical Parkway.

Figure 1.2 Transportation Recommendations for Mid-Sized Events



- Route westbound visitors on U.S. 60, SR 143, and other routes east of Jamestown Road and within the city of Williamsburg to the Island/Settlement via the Colonial National Historical Parkway.
- Restrict through movements at the SR 199/SR 31 intersection from the north to local traffic.

Parking

Current plans call for the Settlement and NPS Properties to provide roughly 1,200 permanent and temporary automobile parking spaces for all events. Currently, the NPS is considering options for a reconfigured Visitor Center at Jamestown Island. Included in that study is a consideration of parking needs. One option calls for parking spaces to be constructed at the Island Visitor Center, Glasshouse Point, and Neck of Land. The Jamestown-Yorktown Foundation is also reconfiguring its parking lot to increase safety and operational efficiency.

In order to serve peak-parking needs generated by events attracting more than 4,000 persons, space for additional parking must be created, if auto access is to be permitted. Assuming that 25 percent of visitors arrive by bus, a 13,000-person event would require about 2,050 additional parking spaces. There are several private and public land parcels in the immediate vicinity that could be used for parking on a temporary basis. James City County has indicated that it wishes to keep Mainland Farm in productive use as farmland throughout 2007 and does not consider it a viable parking alternative at this time. Initial contacts have been made with the Vermillion family to ascertain the availability of using the Jamestown Campground land for overflow parking. The campground, which is located directly across from the Jamestown Settlement on SR 31, has sufficient land for roughly 3,000 parking spaces.

- Continue discussions with private landowners for leasing as overflow parking to serve parking demands for small and mid-sized events during 2007.
- Investigate the suitability of the Jamestown High and Clara Byrd Baker Elementary School parking lots for temporary parking during the summer season and on weekends. Both these sites are relatively close to the Settlement/Island area. The high school and elementary school have 200 and 100 parking spaces, respectively.

Transit Recommendations

For the mid-sized events, a system of shuttle buses will be required to transport visitors from most of the available parking spaces to the commemorative event venues. Additionally, the interior shuttle services recommended for the major events should be provided for the mid-sized events, but at relatively low frequencies.

- Provide buses to shuttle visitors between interior parking lots and event venues. Interior parking locations may include the Jamestown Island Visitor Center, Neck of Land, Glasshouse, the Jamestown Settlement, and additional parking facilities whose locations are to be determined. These buses would operate on a continual basis before and after the events and at less regular intervals during the events.
- Provide shuttle bus service from the hotel corridors and the Williamsburg Visitor Center and the Williamsburg train station. The frequency of service depends on the specifics of the event, but may range from five to 20 minutes.
- Serve larger events in this range (10,000 to 13,000 persons) with the hotel and park-and-ride intercept shuttle system described for major events. Buses running at 15-minute frequencies should provide adequate service.

Recommendations – Small Events

Events attracting not more than 4,000 people will create relatively minor impacts to the Historic Triangle's transportation system if demands are properly managed. Small events are defined as those requiring few if any additional parking resources other than those

currently planned for the venues. While the provision of the intercept park-and-ride lots and their shuttle services would be beneficial, they are not necessary to avoid excessive congestion, unless other significant events in the immediate area coincide with these small events.

This plan recommends the following transportation actions for these events:

1. Develop a route guidance and signage system that encourages visitors to circumvent the SR 31/SR 199 intersection. To the east, SR 199 and the Colonial Parkway should be the preferred means of access. To the west, Monticello Avenue, Ironbound Road, and Sandy Bay Road should be the primary access routes to the venues.
2. Implement and operate the Colonial Parkway shuttle bus service at 15-minute intervals between Colonial Williamsburg, Jamestown, and Yorktown.
3. Implement and operate expanded service on the U.S. 60 north/south bus routes at 10- to 15-minute intervals or less during periods of peak demand. Provide an additional two buses over anticipated levels.
4. Develop a ferry park-and-ride lot in Surry County as conveniently located as possible to the town of Surry.

■ 1.3 Planning and Organizational Recommendations

Event Planning

The time required to implement a transportation service, operational improvement, or capacity enhancement can be significant. Extensive coordination with partner agencies, the state legislature, and the public is required. More detailed planning, including venue access and traffic and bus operations planning will be necessary. Leasing agreements for buses and parking lots must be arranged. Some construction will be required for parking lots that now occupy vacant land.

Until the events themselves have been finalized, the transportation plan recommendations and associated funding requests described in this document can only reflect an approximation based on the informed opinions of the Jamestown-Yorktown Foundation and others responsible for planning the commemoration. However, because the major events will produce impacts that will severely tax the Historic Triangle's transportation system, even a small change in dates, duration, or location will have a major effect on the resources needed (or ability) to provide a well-functioning transportation system.

With this in mind, the following recommendations related to event planning needs should receive immediate attention:

- Establish, with reasonable certainty, the times, dates, locations, activities, and expected attendance levels of all major events for the Jamestown 2007 commemoration by the end of 2003.
- Schedule major events on non-holiday weekends during the spring and fall months to the maximum degree possible.

Advance ticketing for events reduces the uncertainties of crowd and traffic management, and presents valuable marketing opportunities. Advance ticketing also provides information on party size and point of origin, which in turn indicates, with some certainty, the location and magnitude of transportation demands. A request for a ticket automatically presents the opportunity to provide information on lodging, transportation alternatives, and other points of interest in the region, which could generate advertising revenues. Moreover, an Internet-based reservations system would reduce transaction costs and provide a very effective means of communicating travel options to prospective visitors.

Joint-ticketing arrangements could be developed between Colonial Williamsburg, the Jamestown Settlement, and the NPS as the brokers for package deals including lodging and passes to other regional attractions and the Williamsburg Hotel-Motel Association. These tickets could be obtained through use of the Jamestown 2007, Jamestown-Yorktown Foundation, Colonial Williamsburg, and Colonial National Historical Park web sites, by phone, or by mail.

Thus, an early action event-planning activity is to:

- Develop and implement an advance-ticketing program for all major events (preferably an Internet-based system); and
- Develop joint ticketing programs for 2007 special events, combining transportation, lodging, and passes to other regional attractions.

Organizational Structure

The transportation service and event-planning activities outlined above will not appear of their own accord. A broadly based planning and implementation process will need to be continued from this date through the completion of the 400th anniversary commemorative activities. To ensure that these technical recommendations are successfully implemented, the establishment of a multi-level planning structure is proposed.

Transportation Coordinator

As planning moves to implementation, transportation logistics and operations should be managed through a single point of coordination. This “point of coordination” could be a single individual, or a small number of individuals, with responsibility for managing the day-to-day transportation needs and operations of Jamestown 2007. Specific responsibilities could include managing the field operations of buses on event days, coordinating

emergency and security activities, and overseeing leasing arrangements with bus operators or land holders.

Small Working Groups

The recommendations presented require more in-depth analysis and coordination to support the more detailed budget and staffing requests they will generate. We recommend that the members of the Transportation Logistics Working Group and others nominated by the group continue to work with the consultant team on the following components of the Jamestown 2007 transportation system. These elements should be considered not only in the context of major event planning as they have been described here but, just as importantly, in the context of the hundreds of small events that are anticipated to occur throughout the Commonwealth between late 2006 and the end of 2007:

- Park-and-Ride/Park-and-Walk Lots;
- Local and Intercity Bus and Rail Transit;
- ITS and Visitor Information Systems;
- Traffic Control and Operations;
- Transportation Demand Management; and
- Venues and Events Operations.

At the conclusion of the 400th Anniversary commemoration, the Logistics Transportation Working Group might be assigned a final responsibility to produce what could be termed an “after-action report.” This would serve to document how well the implementation of the strategic transportation plan accomplished its goals, identify any problems or issues that were observed and how they were addressed, and outline the protocols by which the transportation elements for the 450th Anniversary commemoration in 2057 might be formulated.

■ **1.4 Estimated Costs**

Tables 1.2 to 1.5 present preliminary order-of-magnitude cost estimates for the Jamestown 2007 transportation system. Costs expected to be incurred over the course of the entire year, as well as costs for mid-sized and major events are included. These preliminary cost estimates have been prepared under the assumption that there will be only two major events and approximately six mid-sized events over the course of the year. These estimates are subject to numerous uncertainties, the most important of which is the disposition of the events themselves. These estimates should thus be considered rough approximations only.

Cost estimates for yearlong transportation services and supplemental services to accommodate small events are shown in Table 1.2. Included in these estimates are costs for the purchase of buses to operate the Colonial Parkway shuttle and expanded shuttle service on U.S. 60. Costs estimates for basic signage are included, as are costs for developing a parking facility near the ferry service in Surry County. Also shown is an estimate for transportation coordination and planning leading up to 2007.

The costs shown do **not** include the salaries and other associated costs for fire, police, and other emergency services support. Also not included are leasing costs for parking on undeveloped land.

Table 1.2 Estimated Costs for Jamestown 2007: Yearlong/Small Event Transportation System

Service	Description	Estimated Costs
Bus Operations	Colonial Parkway Services	\$945,600
	U.S. 60 Services	270,200
Parking	Construction	N/A
	Leasing	N/A
Other	Planning/Coordination	1,000,000
	Transportation Information Brochures (150,000)	200,000
	Web-based Trip Planner	100,000
Subtotal (Operations, Parking, and Other)		\$2,515,800
Bus Purchase	Colonial Parkway Service	
	(ATS Study: Seven Buses)	\$2,415,000
	U.S. 60 Buses (Two Additional)	580,000
Subtotal (Bus Purchase Only)		\$2,995,000
TOTAL		\$5,510,800

Cost estimates for major events are shown in Table 1.3. These estimates describe the increment of funding needed over the basic services to serve major events, and include the cost of leasing and operating all shuttle buses on the Colonial Parkway and U.S. 60. Also included are construction costs for park-and-ride lots to serve the major events.

**Table 1.3 Estimated Costs for Jamestown 2007 Transportation System:
Two Major Events Assumed**

Service	Description	Estimated Costs
Amtrak Rail Service	12 Trips Daily: Richmond – Newport News	\$155,300
Ferry Service	Increased Frequency: Surry County – Jamestown	28,130
Bus Lease	All Routes	357,240
Bus Operations	Dispatch Personnel and Supervisors	95,110
Parking (Including Security)	Leasing	417,600
Traffic Operations (Including Security)	Signs	147,270
TOTAL (Two Events)		\$1,200,650

Cost estimates for mid-sized events are shown in Table 1.4. The cost estimates assume six relatively well attended events (13,000), and describe the increment of funding needed over the basic yearlong transportation services to serve them. These estimates include the cost of leasing and operating all shuttle buses on the Colonial Parkway and U.S. 60.

**Table 1.4 Estimated Costs for Jamestown 2007 Transportation System:
Six Mid-Sized Events Assumed**

Service	Description	Estimated Capital and Operating Costs
Bus Lease	All Routes	\$410,700
Bus Operations	Dispatching and Supervision	70,500
Parking	Lease	60,000
Traffic Operations	Police/Fire Support	115,900
TOTAL		\$657,100

All costs are combined in Table 1.5 below.

**Table 1.5 Estimated Costs for Jamestown 2007 Transportation System:
Summary**

Service	Yearlong	Mid-Sized	Major	Total
Bus Lease and Operations	\$1,215,800	\$481,200	\$452,400	\$2,149,400
Ferry Operations			28,100	28,100
Traffic Operations	N/A	115,900	147,300	263,200
Parking	N/A	60,000	417,600	477,600
Planning and Coordination	1,300,000		N/A	1,300,000
Additional Amtrak Service			155,300	155,300
Subtotal (Bus Operations, etc.)	\$2,515,800	\$657,100	\$1,200,700	\$4,373,600
Bus Purchase	2,995,000	N/A	N/A	2,995,000
TOTAL (With Bus Purchase)	\$5,510,800	\$657,100	\$1,200,700	\$7,368,600
TOTAL (Adjusted for 3.5 Percent Annual Inflation)				\$8,169,700

Note: Numbers rounded to nearest 100.

Finally, Table 1.6 below presents the distribution of estimated costs by year. Capital expenditures for bus purchases corresponding to transportation plans for Williamsburg Area Transport and the Colonial Parkway begin in 2004. With the exception of funding for continued planning and coordination, most other costs are incurred in 2006 or 2007.

**Table 1.6 Estimated Costs for Jamestown 2007 Transportation System:
Summary by Fiscal Year**

Service	FY 2004	FY 2005	FY 2006	FY 2007	Totals
Bus Purchase	\$580,000	\$1,500,000	\$915,000		\$2,995,000
Bus Lease and Operations			861,800	\$1,287,600	2,149,400
Ferry Operations				28,100	28,100
Traffic Operations				263,200	263,200
Parking				477,600	477,600
Additional Amtrak Service				155,300	155,300
Planning and Coordination	250,000	250,000	350,000	450,000	1,300,000
TOTALS	\$830,000	\$1,750,000	\$2,126,800	\$2,661,800	\$7,368,600
TOTAL (Adjusted for inflation)					\$8,169,700

Note: Costs shown do not include all police, fire, or other emergency personnel costs.

■ 1.5 Next Steps

In order to successfully provide for the recommended elements of the Jamestown 2007 Transportation Plan, a number of additional plan refinement and detailing activities will need to be completed over the next several years. These include the following:

- Continuing facilitation of Transportation Logistics Working Group Meetings;
- Conduct continuing outreach meetings with potential Jamestown 2007 partners, including HRT, Hampton Roads Planning District Commission, and agencies responsible for traffic operations;
- Coordinate with Jamestown/Yorktown Foundation, NPS, APVA, and other local and regional organizations to develop a final events itinerary for Jamestown 2007;
- Continue outreach efforts to statewide 2007 partners to determine the potential transportation requirements of their events;
- Develop a more detailed traffic operations/management plan for the overall Historic Triangle area;
- Develop a traveler information and regional visitor information plan;
- Continue to develop detailed venue-access plans for the Jamestown Settlement, Jamestown Island, and Yorktown Battlefield;
- Develop a more detailed regional parking plan, particularly including the location and operation of regional park-and-ride lots;
- Develop more detailed capital and operating cost estimates for 2007 transportation plan;
- Develop a detailed operations and circulation plan for the Island and the Settlement, potentially using simulation tools to develop bus staging plans, which should include a detailed analysis of the Parkway as a bus-only facility for major events;
- Develop a detailed traffic circulation plan to protect neighborhoods in the vicinity of planned event venues; and
- Continue more detailed traffic analysis of the U.S. 60 corridor.

2.0 Assessment of Mega Event

2.0 Assessment of Mega Event

■ 2.1 Introduction

Jamestown Island and the adjacent Jamestown Settlement have welcomed, entertained, and enlightened millions of visitors over the years, but seldom has a single event attracted more than 10,000 people. The 350th commemoration held at the Settlement is reported to have attracted approximately 35,000 people during the Queen of England's visit in October 1957. A blockbuster, or "Mega Event," attracting up to 100,000 people would be unprecedented at this location and, at a minimum, would require extraordinary logistics and security measures to provide for the safe and efficient movement of visitors through the area.

The purpose of this planning exercise is to determine whether, and under what conditions, a very large-scale event could be staged successfully at the Jamestown Island and the Settlement areas. This preliminary analysis focuses on physical constraints and examines three key factors: 1) the person-carrying capacity of the Island/Settlement area; 2) access constraints, particularly the ability to drop-off/pick-up passengers quickly enough; and 3) additional constraints imposed by parking availability. Each of these factors is addressed in turn below.

■ 2.2 Capacity of Island/Settlement Area

Major renovations to the visitor centers at both the Jamestown Settlement and Jamestown Island are underway. These renovations are expected to bring the history and drama of the Jamestown experience to visitors in a more compelling way than ever before. They will also make it possible, through visitor capacity enhancements such as expanded parking and larger exhibit halls, to attract more visitors. These renovations are not designed for attendance on the level of a "Mega Event," however. Such an event, if staged at the Island/Settlement area, would have to utilize the fields and open areas on the grounds of these facilities.

While the Settlement utilizes almost two-thirds of its total available land area of 29.7 acres for parking and permanent structures, Jamestown Island (parts of which are owned jointly by the NPS and the APVA) comprises in total more than 1,500 acres of land. As shown in Table 2.1 below, the Settlement perhaps can accommodate nearly 50,000 persons, if each person occupies the amount of space typical of an outdoor exhibition (10 square feet per person). As for Jamestown Island, less than two percent of the total existing land area is

actually available for use by visitors at an outdoor exhibition because of the presence of dense woodlands and wetlands. Thus, there appears to be barely enough space available on the Island itself for a 100,000-person size “Mega Event.” If access constraints were not an issue, the combined size of the landmass at the Island/Settlement area could theoretically accommodate a sizable number of visitors.

Table 2.1 Preliminary Assessment of “Mega Event” Space Requirements

Location	Portion of Site	Area (Acres)	Maximum Capacity ¹	
			@6 Sq. Ft./Person	@10 Sq. Ft./Person
Jamestown Settlement	Total Area	29.7	215,600	129,000
	Usable Area ²	10.9	79,000	47,000
Jamestown Island	Total Area (with APVA)	1,583.5	11,496,300	6,897,700
	Usable Area ² (1.5%)	24.5	177,900	106,700

¹ Source: Chapter 18 – Pedestrians, 2000 Highway Capacity Manual.

² Usable area excludes parking areas, buildings, and environmentally sensitive areas; Source: Jamestown/Yorktown Foundation and the National Park Service.

■ 2.3 Pedestrian Capacity at Points of Entry

Currently, visitors to Jamestown Island must walk across an approximately 15-foot wide wooden bridge on their way from the parking lot to the visitor center. Although plans underway may ultimately provide additional points of access to the Island for pedestrians and small water taxis, the total capacity of these access points is not expected to increase appreciably. An illustration of the constraints imposed by these points of access is shown in Table 2.2, which lists the amount of time required for 100,000 persons (walking at a given rate of speed and a given density) to cross an area of varying widths.

With a relatively tightly packed crowd, uniform, moderate pacing, one-way traffic, and *no security measures in place*, the inbound pedestrian movement associated with a 100,000-person event would require almost six hours to process using the existing walkway. This is clearly an unacceptable amount of time to process a crowd for a blockbuster event with a single start and end time, such as a commemorative dedication activity.

Table 2.2 Pedestrian Access Requirements for 100,000 Persons

Width of Walkway (Feet)	High Density (2.0 to 4.6 Sq. Ft./Person) ¹	
	Persons Passing Per Hour	Hours Required to Process 100,000 Visitors
10	10,500	9.5
15	18,000	5.6
20	25,500	3.9
30	40,500	2.5
40	55,500	1.8
50	70,500	1.4
60	85,500	1.2

¹ Source: 1999 Transit Capacity and Quality of Service Manual.

There are other scenarios that can be considered as well. It is not unusual for large, single events to require three hours of processing time. A 50,000-person event would require fewer than three hours to process inbound and another three hours outbound, again assuming one-way pedestrian traffic flow, as described above.

■ 2.4 Bus Frequencies

The primary transportation access to a large-scale commemorative event would necessarily be limited to bus transportation, with pick-up and drop-off locations probably located at the existing parking lot on Jamestown Island. Buses would presumably arrive and depart via the Colonial Parkway, leaving SR 31 available for priority VIP, security, and emergency vehicles. With a tightly spaced platoon of full buses operating at 10-second intervals, more than six hours would be required to process 100,000 persons, *not including loading/unloading time* (see Table 2.3 below). Roughly one-half of that time would be required for a 50,000-person event.

Table 2.3 Transit Access Requirements for 100,000-Person Event

Average Bus Frequency (Seconds)	Buses Per Minute	Buses Per Hour	Hourly Capacity (@ 45 Persons/Bus)	No. of Hours Required
60	1	60	2,700	37.0
30	2	120	5,400	18.5
20	3	180	8,100	12.3
15	4	240	10,800	9.3
12	5	300	13,500	7.4
10	6	360	16,200	6.2
5	12	720	32,400	3.1

■ 2.5 Bus Terminal Needs

The number of passengers that can be processed at the bus access pick-up/drop-off areas is a significant constraint on the size of any Jamestown 2007 event. The processing capacity is determined by the configuration and the amount of land available for staging passenger pick-up and drop-off activities. Currently, the Jamestown-Yorktown Foundation and the NPS are reconfiguring their parking areas as part of their larger visitor facility renovation and reconstruction efforts, both of which are scheduled for completion by 2007.

Table 2.4 below displays estimates of the space required to process a given number of passengers at a parking lot or other open area. Space requirements for two types of bus arrivals are shown:

1. Requirements for buses guided to open parking areas by attendants (assigned berth); and
2. Requirements for buses that wait in a single line to discharge passengers at a given location (queued to berth).

While the assigned-berth buses require more linear space (80 feet) because some buses must maneuver around parked buses, they can process passengers faster because arriving and departing buses do not have to wait in a queue.

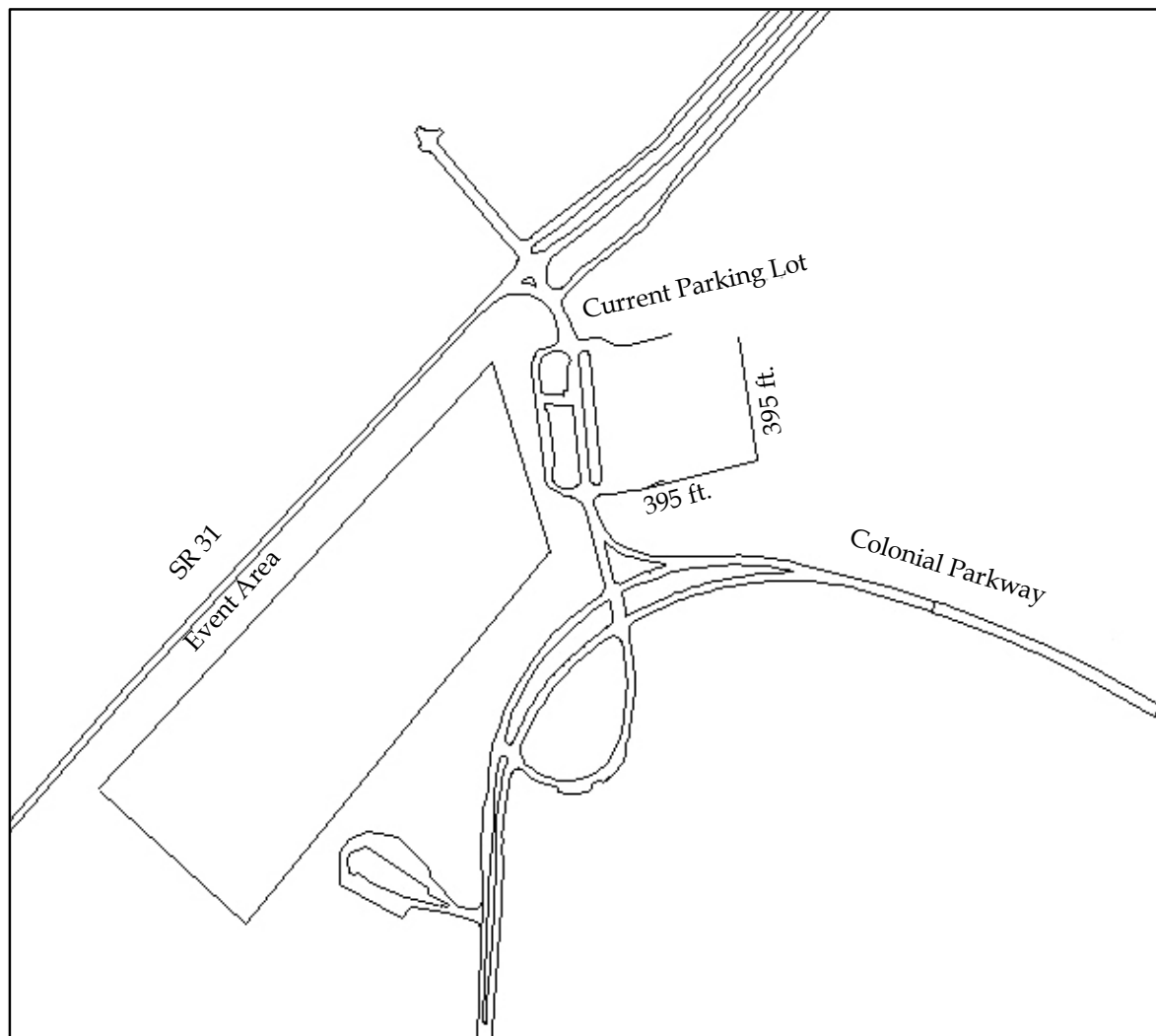
Table 2.4 Space Requirements for Bus Pick-up/Drop-off Areas

Passengers Processed Per Hour	Length of Space Required (Feet) ¹	
	Assigned Berth	Queued to Berth
3,000	250	500
6,000	450	950
11,000	800	1,750
15,000	1,150	2,400
30,000	2,250	4,700
45,000	3,380	7,050
Unload Time	2.2 Minutes/Bus	8.2 Minutes/Bus
Linear Space per Bus	80 Feet	45 Feet

¹ Source: 1999 Transit Capacity and Level of Service Manual.

As shown in the table, a considerable amount of space – more than 2,250 linear feet – would be needed to process 100,000 people arriving over a three-hour period. Roughly speaking, the dimensions of the currently available staging areas, the parking lots at the Settlement and the Island, are 395 feet by 395 feet and 485 feet by 250 feet, respectively. If the bus drop-off/pick-up area extended the total length of the perimeter of both existing parking lots, the total space available would be approximately 3,050 feet (see Figures 2.1 and 2.2). This amount of linear space would be sufficient to process roughly 40,500 persons per hour, short of the amount needed to accommodate the arrivals for a 100,000-person single event in a reasonable amount of time. Additionally, an internal shuttle to transport visitors from the Settlement to the Island would probably be required, which would further reduce the effective capacity. It is possible that some of the internal space in the Jamestown Island parking lot could be used for processing as well, but the interaction between moving buses and discharged passengers would have to be tightly controlled.

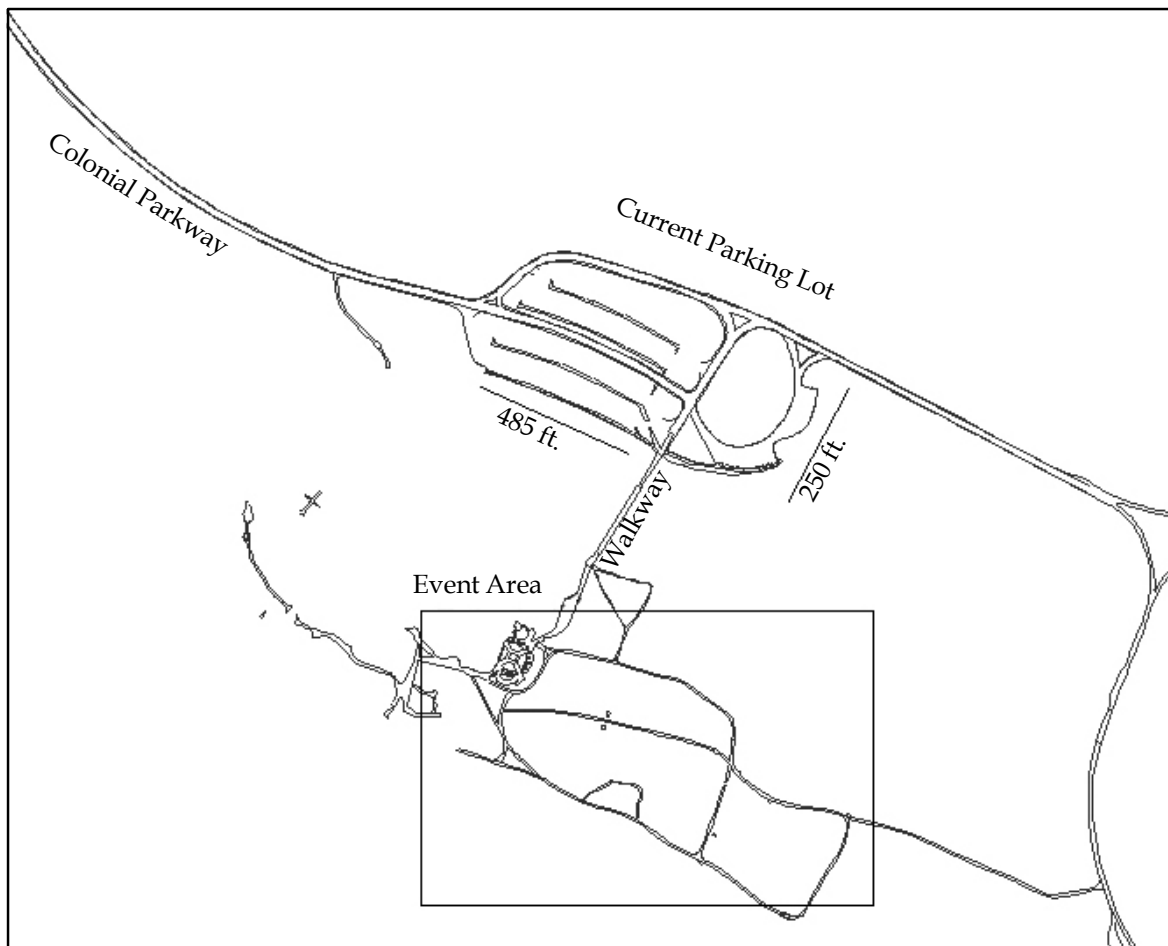
Figure 2.1 Jamestown Settlement Current Configuration



■ 2.6 Parking Needs

Based on this needs assessment, a 100,000-person event would generate a need for 25,000 parking spaces. This assumes that one-fourth of the attendees (or about 25,000 visitors) would park at hotels in the Jamestown/Williamsburg area and ride local transit services to the event, and further assumes that they would not require the use of a designated park-and-ride lot for shuttle bus services to the Island/Settlement area. As Table 2.5 below shows, there are approximately 1,700 fewer potentially available parking spaces (excluding military facilities) near high-capacity roadways at major parking locations between York County and Newport News as there are parking spaces required to stage such a large event.

Figure 2.2 Jamestown Island Current Configuration



Adding the parking spaces available at the Colonial Williamsburg Visitors Center, which requires travel through the local road system, would bring the total near 25,000. Of these 25,000 potential spaces, almost half would likely need to be provided by Busch Gardens and Water Country USA, presumably through some leasing agreement. However, if the commemorative event occurred during the warm visitor season, then the availability of spaces at Busch Gardens and Water Country USA would be considerably smaller, and the amount of available parking would pose a serious constraint to the sizing of a large-scale event. If all of the available hotels and motels in Williamsburg are almost fully occupied, a 50,000-person event would generate a need for approximately 12,500 off-site/satellite parking spaces, which is close to the number of available spaces, excluding consideration of Busch Gardens and Colonial Williamsburg.

Table 2.5 Parking Resources for 100,000-Person Event

Location	Parking
Busch Gardens	10,000 +/-
Water Country USA	1,200 +/-
Thomas Nelson Community College	2,100
Hampton Coliseum	3,200
City of Newport News	2,000
Subtotal - South Lots	18,500
Colonial Williamsburg	2,000
I-64 North Temporary Lot (New)	2,100
York County High School	1,000
Subtotal - North Lots	5,100
Total Potential Parking	23,600

■ 2.7 Conclusions and Recommendations

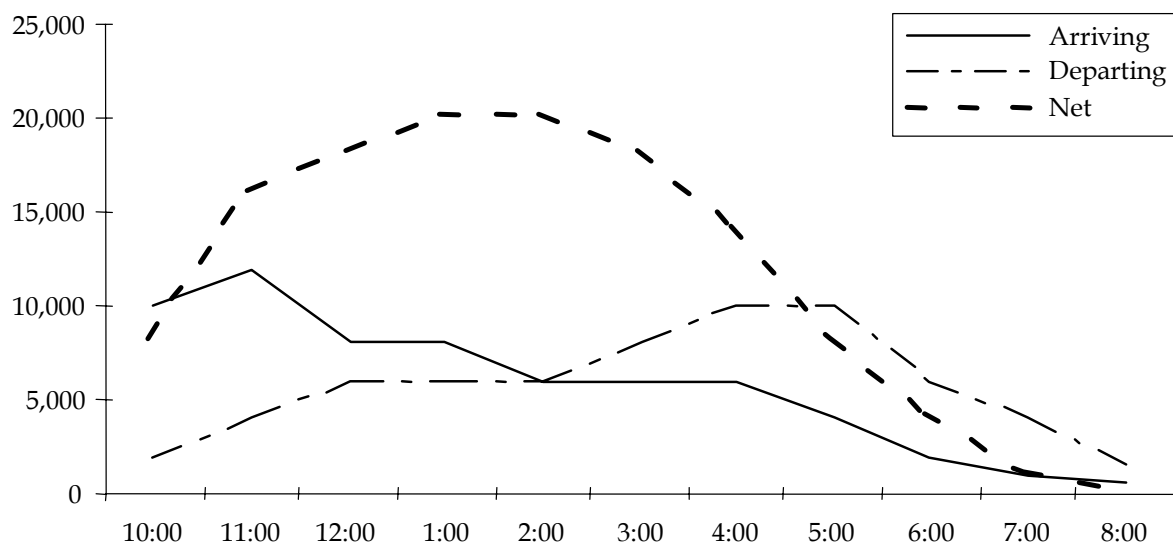
Based on the preliminary planning-level assessment described here, a single event exceeding 35,000 to 40,000 persons staged at the Settlement/Island area would encounter serious delays in processing visitors because of a number of capacity constraints. The most severe constraint is the lack of space required to process a very large number of visitors in a bus pick-up/drop-off area. Moreover, pedestrian access constraints and the physical boundaries of the event venues also significantly limit the maximum number of visitors that can occupy the site at any one time.

Event planners should consider the following recommendations in developing any “Mega Event”:

- If the event is a single-time event staged at the Settlement/Island area, attendance should be limited to no more than 35,000 persons.
- For a single-time event, the largest parking areas near the Settlement and Island should be utilized, and a shuttle bus system developed to transfer visitors between the two areas.

- If planners anticipate an event drawing a larger audience, the venue should be moved to an appropriate location. Possible alternative locations include the city of Williamsburg, Newport News, Norfolk, and Richmond.
- In order to maximize attendance and reduce logistics issues, event planners should consider a day-long series of events, staged similarly to a fair, in which visitors come and go on their own schedules. Even a modest-sized “Mega Event” of this nature could allow for the accommodation of more than 60,000 visitors if the event were spread out over the day. In the arrival and distribution pattern displayed for a hypothetical event in Figure 2.3 below, a total of 63,500 visitors are shown to arrive throughout the entire day, with each staying between two to three hours. This type of arrival and departure patterns is consistent with the physical constraints of the Island and Settlement.

Figure 2.3 Hypothetical Arrival and Departure Pattern for Mega Event



3.0 Summary of Proposed Venue Operations for Jamestown 2007

3.0 Summary of Proposed Venue Operations for Jamestown 2007

■ 3.1 Introduction

Section 3.0 presents a description of the proposed shuttle bus services that would be required to serve a large-scale commemorative event in 2007 at either Jamestown Island or the Jamestown Settlement. Route characteristics and access/egress operations at the Island and Settlement are discussed. The services discussed here are a refinement of the original shuttle bus services proposed in the Phase I *Comprehensive Plan*. Section 3.0 also presents initial conceptual configurations for the bus loading and unloading facilities at Jamestown Island and the Jamestown Settlement. Further refinements will be possible once more is known about the specific locations and characteristics of the large-scale events.

■ 3.2 Summary of Findings

As a follow-up to the Phase I study, the six originally proposed bus routes for a large-scale event (30,000 + persons) were examined in more detail. Three of these routes would operate along US 60/Bypass Road, two would operate from park-and-ride lots located near the I-64/SR 199 interchanges north and south of Williamsburg, and one would operate as a shuttle from the Colonial Williamsburg Foundation's Visitor Center. Assuming fully occupied buses (65 persons per bus, including an average of 20 standees on each typical 45-seat vehicle), at least 187 buses carrying a total of 34,400 passengers would be required to service the event. Assuming a private-sector lease rate of \$65 per hour and 12 hours of service, the cost of this service would total \$134,000 for each day of an event of this size. Buses would arrive at or depart from the venue at a rate of roughly two buses per minute. Bus frequencies on individual routes would be low enough to maintain proper spacing and avoid the formation of bus platoons (groups). A bus operation that allowed only 45 persons per bus (no standees) would serve 26,400 persons over a three-hour period, cost \$180,000 per day, and require frequencies as low as 1.3 minutes per bus. Such high frequencies may create congestion problems both along the routes and at the pick-up/drop-off points. Where feasible, therefore, we recommend using higher capacity buses or permitting standees to minimize costs and to facilitate efficient operations.

**Table 3.1 Jamestown 2007 Shuttle Bus Operations –
Distinctions Between Shuttle Operations with Vehicles Operating at 45
versus 65 Passenger Capacity**

Shuttle Route	Number Of Stops	65 Passenger Capacity					45 Passenger Capacity				
		Passengers Per Hour	Passengers In Three Hours	Frequency Of Service (Minutes)	Number Of Buses	Estimated Service Cost	Passengers Per Hour	Passengers In Three Hours	Frequency Of Service (Minutes)	Number Of Buses	Estimated Service Cost
1. Colonial Williamsburg/Jamestown Shuttle	2	640	1,930	6.1	6	\$4,680	660	1,980	3.6	10	\$7,800
2. Hotel Shuttle North	12	1,110	3,340	3.5	26	\$20,280	1,160	3,480	2.1	45	\$34,320
3. Hotel Shuttle Bypass Road	10	1,150	3,460	3.4	24	\$18,720	1,180	3,550	2.0	40	\$31,200
4. Hotel Shuttle South	12	1,200	3,590	3.3	24	\$18,720	1,230	3,680	2.0	40	\$31,200
5. Satellite Park-and-Ride Shuttle North	3	2,060	6,180	1.9	30	\$23,400	1,270	3,800	1.9	30	\$23,400
6. Satellite Park-and-Ride Shuttle South	3	2,910	8,720	1.3	40	\$31,200	1,790	5,360	1.3	40	\$31,200
7. Scotland Ferry Shuttle	2	1,560	5,850	15.0	30	\$11,700	1,080	3,240	15.0	30	\$11,700
8. Williamsburg Transportation Center Shuttle	2	450	1,350	60	7	\$5,460	450	1,350	60	10	\$7,800
TOTALS		11,280	34,420		187	\$134,160	8,820	26,440		245	\$178,620

Pick-up/Drop-off Locations

Figures 3.1 and 3.2, respectively, depict conceptual pick-up/drop-off bus stop designs for the Jamestown Island and Settlement. These pick-up/drop-off areas are designed to serve a large-scale event configured for a 65-person capacity bus operation, as described above. For an event whose focal point is Jamestown Island, the existing visitor parking lot would be configured as a bus only area. Bus bays would be designated for each of the individual routes, with the highest-frequency routes occupying multiple bays. With one exception, buses would enter the lot, proceed to their designated bay, discharge their passengers and leave, circulating in a counter-clockwise direction (Figure 3.1). Parking lot operators will control pedestrian and bus movements, minimizing potential conflicts. A minor and temporary expansion of the existing visitor parking lot on the southwest side may be required in order to accommodate all access and egress movements.

For a large-scale event whose focal point is the Jamestown Settlement, this plan recommends that the expanded parking lot be used as a staging area for bus pick-up/drop-off operations. According to parking lot design, two portions of the lot are directly accessible from SR 31. The southwest area of the parking lot is physically separated from the main lot, and can be used for VIP and emergency vehicle parking. The northwest corner of the lot, which is planned as a parking area for tour buses, can be used as a staging area for the Scotland ferry buses. Finally, the main portion of the parking lot can be used as the primary bus pick-up/drop-off area. The new alignment of SR 359 will access the main lot in two locations, on the east and north ends of the lot. One of several options for staging bus operations at the main lot is for buses to enter from the north end of SR 359, proceed southward along the main aisle, and drop passengers off on the northwest and southwest quadrants of the lot. The buses would then exit and proceed back to the Colonial Parkway through the east entrance. This arrangement has two advantages. First, it allows buses to operate in a one-way loop from and to the Colonial Parkway. Second, the entire eastern half of the lot is left open as a bus layover area, or as a command post for bus operations and security. This and other options for the venue access will continue to be explored as more is learned about the specifics of the May 13 events.

■ 3.3 Overall Route Characteristics and Assumptions – Large-Scale Event

- Capacity target: 30,000 people transported one way over a three-hour period over seven separate shuttle bus routes, with a minimum of 3,000 people transported via the Jamestown-Scotland Ferry.

Figure 3.1 Proposed Jamestown Island Shuttle Bus Pick-up/Drop-off Area

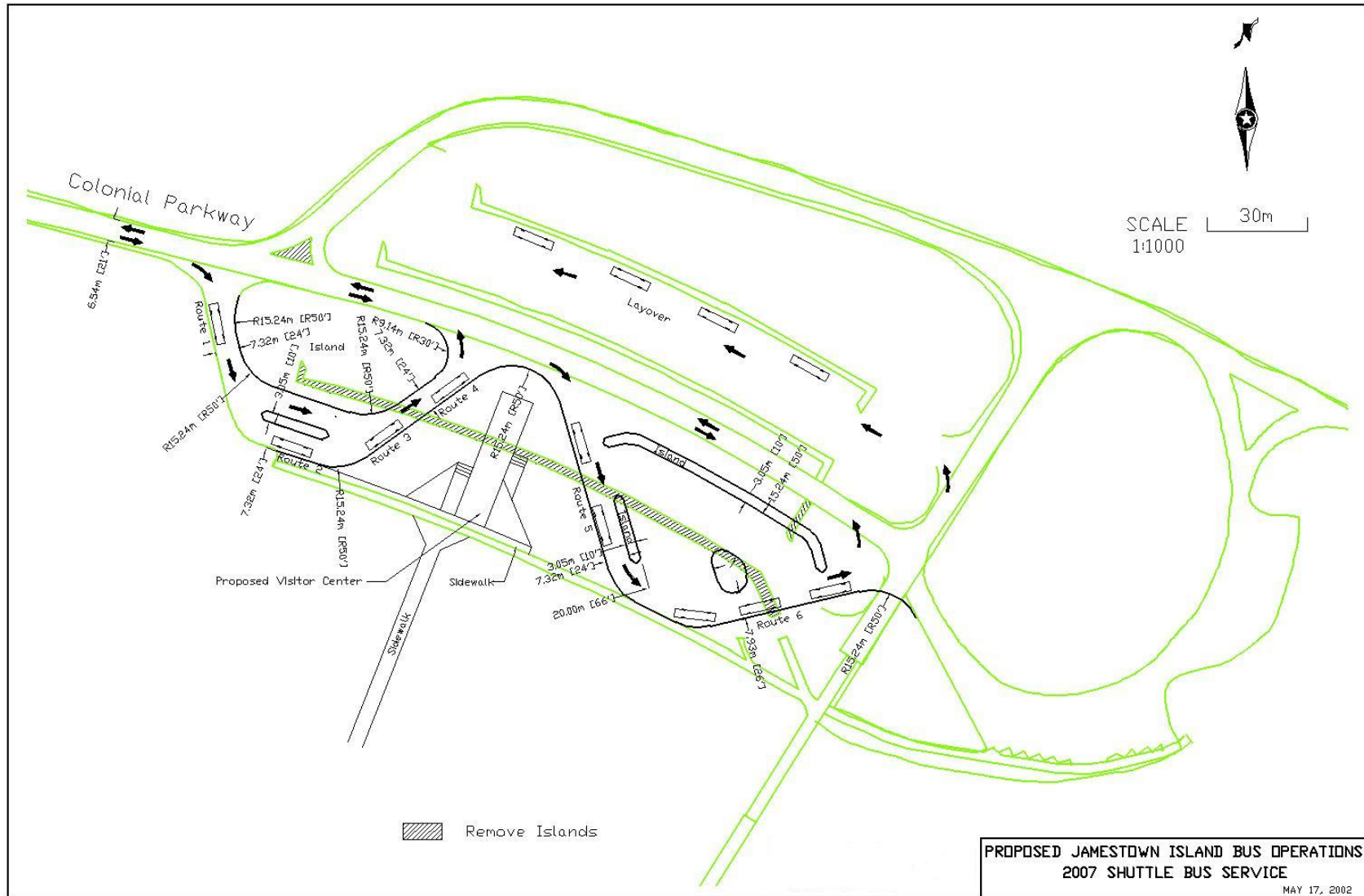


Figure 3.2 Proposed¹ Jamestown Settlement Shuttle Bus Pick-up/Drop-Off Area



¹ This configuration is one of several under consideration.

- Once a bus arrives at its destination, there is a brief layover and the bus then operates a route back to its origin – no “deadhead” operations are envisioned once service begins.
- Bus companies will be responsible for maintaining the required number of buses throughout the day and making suitable arrangements for driver breaks and vehicle breakdowns.
- Vehicles are assumed to be full-size (45-seat) transit buses with a passenger capacity of 65 people, which includes standees – 150 vehicles are estimated to be required to operate the service.
- Each bus is assumed to be full when it departs its final loading point for its destination at either Jamestown Island or the Jamestown Settlement.
- Seven routes will be in operation as follows:
 1. Colonial Williamsburg Visitor Center/Jamestown Shuttle:
 - Two stops/departures every six minutes;
 - Average one-way trip time of 16 minutes; and
 - Capable of transporting approximately 1,930 people (one way) over three hours, maximum.
 2. Hotel Shuttle North:
 - Twelve stops/departures every three and one-half minutes;
 - Maximum one-way trip time of 44 minutes;
 - Average one-way trip time of 23 minutes; and
 - Capable of transporting approximately 3,340 people (one way) over three hours, maximum.
 3. Hotel Shuttle Bypass Road:
 - Ten stops/departures every three and one-half minutes;
 - Maximum one-way trip time of 39 minutes;
 - Average one-way trip time of 20 minutes; and
 - Capable of transporting approximately 3,460 people (one way) over three hours, maximum.
 4. Hotel Shuttle South:
 - Twelve stops/departures every three and one-half minutes;
 - Maximum one-way trip time of 37 minutes;
 - Average one-way trip time of 19 minutes; and
 - Capable of transporting approximately 3,590 people (one way) over three hours, maximum.

5. Satellite Park-and-Ride Shuttle North:
 - Three stops/departures every two minutes;
 - Average one-way trip time of 27 minutes; and
 - Capable of transporting approximately 6,180 people (one way) over three hours, maximum.
 6. Satellite Park-and-Ride Shuttle South:
 - Three stops/departures every one and one-half minutes;
 - Average one-way trip time of 25 minutes; and
 - Capable of transporting approximately 8,720 people (one way) over three hours, maximum.
 7. Scotland Ferry Shuttle:
 - Two stops/departures every seven minutes;
 - Average one-way trip time of 12.2 minutes; and
 - Capable of transporting approximately 4,050 people (one way) over three hours, maximum.
 8. Williamsburg Transportation Center Shuttle:
 - Two stops/departures every hour;
 - Average one-way trip time of 20 minutes; and
 - Capable of transporting 1,350 people (one way) over three hours, maximum.
- The eight routes will be capable of transporting a maximum of approximately 34,420 people, one way, over a three-hour period.
 - The Jamestown Island or Jamestown Settlement bus boarding/alighting area will need to be able to accommodate between 187 and 250 buses per hour.

■ 3.4 Route-Specific Characteristics – Maximum Loads

Route 1 – Colonial Williamsburg/Jamestown Shuttle

Key Characteristics

- Departures every six minutes.
- Average one-way trip time is 18 minutes (includes two minutes of layover).
- Six vehicles required, capacity at 65 (with standees).
- Capable of transporting approximately 640 people (one way) per hour maximum.
- Capable of transporting approximately 1,930 people (one way) over a three-hour period.

- Ten buses depart Colonial Williamsburg per hour.
- Ten buses depart Jamestown per hour.
- Two stops (including Colonial Williamsburg and Jamestown).

Route 2 – Hotel Shuttle North

Key Characteristics

- Departures every three and one-half minutes.
- Maximum one-way trip time is 46 minutes (includes two minutes of layover).
- Average one-way trip time is 25 minutes (includes two minutes of layover).
- Twenty-six vehicles required, capacity at 65 (with standees).
- Capable of transporting approximately 1,110 people (one way) per hour maximum.
- Capable of transporting approximately 3,340 people (one way) over a three-hour period.
- Seventeen buses depart north hotel area per hour.
- Seventeen buses depart Jamestown per hour.
- Twelve stops.

Route 3 – Hotel Shuttle Bypass Road

Key Characteristics

- Departures every three and one-half minutes.
- Maximum one-way trip time is 41 minutes (includes two minutes of layover).
- Average one-way trip time is 22 minutes (includes two minutes of layover).
- Twenty-four vehicles required, capacity at 65 (with standees).
- Capable of transporting approximately 1,150 people (one way) per hour maximum.
- Capable of transporting approximately 3,460 people (one way) over a three-hour period.
- Seventeen buses depart hotel area per hour.
- Seventeen buses depart Jamestown per hour.
- Ten stops.

Route 4 – Hotel Shuttle South

Key Characteristics

- Departures every three and one-half minutes.
- Maximum one-way trip time is 39 minutes (includes two minutes of layover).
- Average one-way trip time is 21 minutes (includes two minutes of layover).
- Twenty-four vehicles required, capacity at 65 (with standees).
- Capable of transporting approximately 1,200 people (one way) per hour maximum.
- Capable of transporting approximately 3,590 people (one way) over a three-hour period.
- Seventeen buses depart 1st south hotel per hour.
- Seventeen buses depart Jamestown per hour.
- Twelve stops.

Route 5 – Satellite Park-and-Ride Shuttle North

Key Characteristics

- Departures every two minutes.
- Average one-way trip time is 29 minutes (includes two minutes of layover).
- Thirty vehicles required, capacity at 65 (with standees).
- Capable of transporting approximately 2,060 people (one way) per hour maximum.
- Capable of transporting approximately 6,180 people (one way) over a three-hour period.
- Thirty buses depart Park-and-Ride lot per hour.
- Thirty buses depart Jamestown per hour.
- Three stops (including Park-and-Ride and Jamestown).

Route 6 – Satellite Park-and-Ride Shuttle South

Key Characteristics

- Departures every one and one-half minutes.
- Average one-way trip time is 27 minutes (includes two minutes of layover).
- Forty vehicles required, capacity at 65 (with standees).

- Capable of transporting approximately 6,180 people (one way) per hour maximum.
- Capable of transporting approximately 8,720 people (one way) over a three-hour period.
- Forty buses depart Park-and-Ride lot per hour.

Route 7 – Scotland Ferry Shuttle

Key Characteristics

- Departures every 15 minutes.
- Average one-way trip time (Scotland side) is 12.2 minutes (includes two minutes of layover).
- Thirty vehicles required, capacity at 45 (no standees).
- Capable of transporting approximately 1,350 people (one way) per hour maximum.
- Capable of transporting approximately 4,050 people (one way) over a three-hour period.
- Twenty-four buses depart Park-and-Ride lot per hour.
- Twenty-four buses depart Jamestown per hour.
- Two stops.

Route 8 – Williamsburg Transportation Center Shuttle

- Departures every 60 minutes.
- Average one-way trip time (Scotland side) is 20.4 minutes (includes two minutes of layover).
- Ten vehicles required, capacity at 45 (no standees).
- Capable of transporting approximately 450 people (one way) per hour maximum.
- Capable of transporting approximately 1,350 people (one way) over a three-hour period.
- Twelve buses depart Jamestown per hour.
- Two stops.

■ 3.5 Jamestown-Scotland Ferry and Shuttle Bus Operations

As noted in Section 3.2, it has been assumed that approximately 3,000 persons would be transported to and from a large event at either the Jamestown Settlement or Jamestown Island via the VDOT operated Jamestown-Scotland Ferry. Based upon information provided by VDOT, it is anticipated that the ferry fleet in 2007 will consist of two 50-passenger car capacity ferries and two 70-passenger car capacity ferries. The constraining capacity limitation on the ferry fleet is the U.S. Coast Guard rated maximum passenger capacity of each vessel, generally defined as the number of life vests carried on each vessel. The larger, 70-car capacity ferries are rated for a maximum of 450 passengers, while the smaller 50-car capacity ferries are rated for a maximum of 350 passengers. With a loading pattern of all 45-passenger buses (assuming no standees), the smaller ferries could transport no more than seven buses, while the larger ferries could transport no more than 10 buses.

Assuming that all four ferries would be in operation at the same time, and that all passengers would be transported on buses, the four vessels could transport a maximum of 34 buses, or about 1,500 persons each way per hour. Over a three-hour period, a maximum of approximately 4,500 persons could be transported each way across the James River via the ferry system. However, it is recognized that some number of local residents and commuters who regularly use the ferry service between their homes and work sites on either side of the river would need to be able to continue to use their private vehicles during the period of any event at the Settlement or the Island.

Current VDOT operational policy limits the number of buses on board any of the ferries at any one time to six when other vehicles are also allowed on board. With six buses on each of the four ferries, a total of 24 buses could be transported each way per hour. However, if the Scotland park-and-ride lot is more than 1.5 miles away from the ferry dock, an additional six buses (for a total of 30 buses) would be required to maintain 15-minute service frequencies associated with the ferry service. Assuming 45-passengers on each bus with no standees, this would represent a one-way passenger flow of approximately 1,350 persons per hour, or about 4,050 persons in each direction during a three-hour period. There thus appears to be adequate capacity provided to accommodate the anticipated share of event visitors who have been assumed to arrive via the ferry.

Assuming that all event visitors using the James River ferry would be transported in buses, automobile parking areas would need to be provided on the Surry County side of the river. At an assumed average vehicle occupancy of 3.0 persons per vehicle, the estimated 3,000 persons anticipated to arrive via the ferry would require approximately 1,000 parking spaces. Representatives of Surry County have indicated that this number of spaces could be made available in and around the Surry County administrative offices and associated county public facilities.

Buses would pick up visitors at these parking areas and travel via Route 31 to board the ferries at the Scotland terminal. Upon arriving at the Jamestown terminal, the buses

would transport visitors to either the Settlement bus parking area along Route 31 or to Jamestown Island via Route 31, relocated Route 359, and the Colonial Parkway.

■ 3.6 Overview of Jamestown Island Pick-up/Drop-off Site

As illustrated on Figure 3.1, the layout of the proposed bus pick-up/drop-up zone has been prepared to conform as much as possible to the existing visitor center parking area. However, to accommodate the minimum turning radii for 40-foot transit buses and provide for passing and other maneuvers on the site, it may be necessary to modify the existing parking area slightly. The area provides a very limited space for shuttle operations and it can be expected that there will be some congestion and stacking during peak periods. On-site management would need to be employed to help minimize loading time, to assist drivers with arrival and departure maneuvers, and to provide control for pedestrian activity.

Overview of Pedestrian and Bus Flows at Jamestown Island Pick-up/ Drop-off Site

The proposed configuration of bus stops at the Jamestown Island will require some temporary modifications to the existing parking lot to allow the buses adequate room to maneuver. This is a function of the size of the buses that need to be accommodated and the number of buses that are required.

The strategy for the proposed layout is based on the following:

- Minimize instances where pedestrians and buses will meet;
- Have buses moving in one direction;
- Operate within the existing parking area to the greatest extent possible; and
- Provide for a bus layover area.

As visitors arrive at the Island, their bus will proceed to a specified area for that particular route. This will also be the point where visitors get on the bus for their trip home, which drivers will announce to passengers as they arrive at the Island. Staff will be on site at each designated stop and direct passengers to events at the Island. Only visitors getting off of the Satellite Park-and-Ride Shuttle North will be required to cross a lane of traffic – all other visitors will use sidewalks to enter the Island.

As visitors leave the Island and walk towards the Visitor Center, staff will be located near the south side of the Visitor Center to direct people to their respective routes. For the shuttles to Williamsburg and the Hotel Shuttle North, visitors will be directed to the west. For the Hotel Shuttle South, Hotel Shuttle Bypass Road, and Satellite Park-and-Ride Shuttle South, visitors will be directed to the east. For the Satellite Park-and-Ride Shuttle

North, visitors will be directed to the north and across one lane of bus traffic to a bus stop just north of the Visitor Center. Staff will be present at the crosswalk to direct the pedestrian and bus traffic.

In addition to staff directing visitors, other staff will be on site to direct bus drivers to their correct boarding areas and also to direct buses as they depart their respective bus stops.

Description of Bus Bay Operations

Route 1 – Colonial Williamsburg/Jamestown Shuttle and Route 2 – Hotel Shuttle North

Drivers would need to maneuver around buses already parked at the other spaces. Upon departure, they would need to be alert to the merging conflict with Routes 3 and 4 that occurs coincidentally with the crosswalk. There is a merging conflict with buses emerging from the Route 5 bay area and a subsequent merge with Route 6. Just before leaving the area, there is a merge conflict with buses leaving the layover area. Route 1 buses returning to the Route 1 parking space in the bay would have to cross over the entrance from the parkway, turn to the left around the island, and then back into the parking space.

During the peak period, the Route 1 and 2 bay would serve 27 buses per hour. Route 2 is the critical route, as it would be serving 17 buses – equivalent to about 3.5 minutes per bus for unloading and loading. This is a very ambitious pace and would be nearly impossible to maintain at a single bus bay even if crews of starters were made available to help in the boarding process. Therefore, it would be highly desirable during peak periods to allow two Route 2 buses in the Route 2 parking space at any one time so that, in effect, the unloading and loading time becomes about seven minutes. As Route 2 is the more heavily used of the two in this bay, its stop has been placed downstream of the Route 1 stop to reduce pedestrian conflicts and to make it easier for Route 2 buses to leave the bay upon their departure.

The planned frequency for Route 1 buses allows six minutes for each bus to be loaded or unloaded, which is a normally acceptable pace. The layout shows roadways of sufficient width to permit buses to pass one another in this bay to avoid stacking and to minimize congestion because of maneuvering.

During peak periods, however, some stacking of buses may occur – especially if they were heavily loaded.

Route 3 – Hotel Shuttle Bypass Road and Route 4 – Hotel Shuttle South

Drivers would need to be alert to a merge with Routes 1 and 2 and the crosswalk just ahead of the turnoff to their bay. They would need to maneuver around buses parked in the other spaces. Upon departure, they would need to be alert to a merging conflict with Routes 1, 2, and 5, and a crossing conflict with Route 6 buses. Subsequently, there is a crossing or merge conflict with Route 6 buses leaving their bay and another merging with buses leaving the layover bay just before reaching the exit to the parkway.

During the peak period, Routes 3 and 4 would each deliver 17 buses (3.5 minutes per bus) to the site. As indicated for the Route 1 and 2 bay, this pace would be nearly impossible to maintain within a single one-vehicle bus bay. Because the bay could hold three buses at one time (although it is tight), it would be desirable to schedule buses on Routes 3 and 4 so that more time can be spent in the bay as described for Route 2, above. During peak periods, however, it can be expected that some stacking of buses will occur – especially if they were heavily loaded upon their arrival at the site. This bay will need constant on-site management to minimize congestion levels during peak periods.

Route 5 – Satellite Park-and-Ride Shuttle North

The only entering conflict for Route 5 buses would be with buses leaving the layover space to re-enter their assigned bays. Merging would occur with all other routes when departing. Unless minor geometric improvements can be made, it may be necessary to perform a backing maneuver to make the full turn into the layover bay. This is very undesirable and should be avoided if at all possible.

The Route 5 bay would serve up to 30 buses per hour – about 10 per space. That would provide about six minutes for each bus. Although it has an easier pace to maintain than other routes, the bay is more confined and maneuvering would reduce the efficiency of the operation.

Route 6 – Satellite Park-and-Ride Shuttle South

Drivers would need to be alert to merging, and the crosswalk and merge conflicts as described above for the other routes. There is a crossing conflict with departing Route 3 and Route 4 buses. Conflicts with all other routes would occur when heading to the layover area. Merging would occur with all other routes when leaving the area.

The Route 6 bay would be serving 40 buses per hour – an arrival and departure rate of 1.5 buses per minute. Although providing three spaces in this bay would theoretically allow about 4.5 minutes per bus, the limited maneuvering space would make operations difficult. Therefore, schedules should be managed so that four buses would be allowed in this bay during peak periods.

Route 7 – Scotland Ferry Shuttle

The Scotland Ferry bus bay would be located north of bus bays 1-6, sharing the area designated for bus layover. The Route 6 bay would be serving up to 30 buses per hour. These buses would arrive with the ferry and so would arrive as a single group at the staging area. Placing the bus bays at the layover area allows for sufficient space for bus pick ups and drop offs and prevents conflicts with Routes 1-6. However, care must be taken to avoid pedestrian conflicts through the crosswalk to the visitor center. Merging would occur with all other routes when leaving the area.

Route 8 – Williamsburg Transportation Center Shuttle

The bus bay for the Williamsburg Transportation Center would be located behind Route 7 (Scotland Ferry bus bay), at the shared layover area, north of bus bays 1-6, sharing the area designated for bus layover. The Route 8 bay would be serving up to 12 buses per hour. These buses would be coordinated with train service and so would arrive as a single group at the staging area. As is the case with Route 7, care must be taken to avoid pedestrian conflicts through the crosswalk to the visitor center. Merging would occur with all other routes when leaving the area.

Overview of Pedestrian and Bus Flows at Jamestown Settlement Pick-up/ Drop-off Site

Using the expanded parking lot at the Jamestown Settlement presents challenges in terms of maximizing operational efficiency and minimizing potential conflicts. While several routing schemes are possible, it is advantageous for buses to circulate through the parking lot in one direction, clockwise or counter-clockwise. Buses arriving from the Colonial Parkway could enter from the northern entrance to the lot from SR 359 and circulate around the perimeter of the northwest and southwest quadrant as they discharge passengers. Bus bays should be located around the perimeter of the lot to the extent feasible. This allows exiting passengers to proceed to walkways and trails leading to the Settlement entrance with no bus conflicts whatsoever. However, forcing buses to circulate around the perimeter of the lot slows them down considerably and thus decreases the efficiency of the operations and the total bus capacity. Devising an optimal internal routing plan will be considered in the next phase of work for this plan. In any case, all drop-off points will have adequate signs directing people to the activities at the Settlement and staff would be present to assist people, direct buses, and answer questions.

As people depart the Settlement, they would be directed to the same area where they got off the bus when they arrived. As people approach the bus boarding area, they would be directed to the route of their choice. It is envisioned that all buses that stop at Jamestown Settlement would also pick-up passengers and continue on to the Visitor Center at Jamestown Island.

It is anticipated that the stop at Jamestown Settlement will take approximately one minute, then the bus would continue on to its final destination. It is not anticipated that people will board the bus at this point to leave the Jamestown area. However, if there are a large number of people who wish to go directly to points north (skipping a trip to Jamestown Island), and the buses arriving from Jamestown Island have room, on-site staff may direct some people across the street to make a direct trip to their final destinations.

Detailed service characteristics of the shuttle bus services under a 65- and 45-passenger per bus scenario are presented in the tables that follow.

■ 3.7 Summary of Shuttle Bus System Operating Characteristics

The following tables present selected details of the general operating characteristics of the recommended shuttle bus system that would be required to accommodate an event with approximately 30,000 attendees at either Jamestown Island or the Jamestown Settlement. Tables 3.2 and 3.3 present the operating characteristics of each of the various shuttle bus routes. Since the same number of vehicles is assumed to be operated regardless of the assumed load factor (e.g., 100 percent seated or 150 percent seated and standing), the daily operating cost of each route will be the same. The total operating cost of the proposed shuttle bus system will thus vary depending upon the number of days that each route will be operated.

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Colonial Williamsburg/Jamestown Shuttle			
Time			
Route Length (Miles)	9.20	9.20	9.20
Average Speed @ MPH (<i>Without Stops</i>)	39	39	39
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	14.15	14.15	14.15
Number of Stops	2	2	2
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	18.15	18.15	18.15
Vehicles in Service	3	3	6
Frequency of Service (Minutes)	6.05	6.05	6.05
Wait Time @ Stop (1/2 Frequency)	3.03	3.03	3.03
Travel Time (1/2 One-Way Trip)	9.08	9.08	9.08
Typical Total Trip Time (Minutes)	12.10	12.10	12.10
Capacity			
Vehicles in Service	3	3	6
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	644	644	644
Passenger Capacity per Day	7,734	7,734	7,734
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	3	3	6
Days of Operation	1	1	1
Total Hours of Service	36	36	72
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$2,340	\$2,340	\$4,680

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle North			
Time			
Route Length (Miles)	15.00	15.00	15.00
Average Speed @ MPH <i>(Without Stops)</i>	24	24	24
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	37.50	37.50	37.50
Number of Stops	12	12	12
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	45.50	45.50	45.50
Vehicles in Service	13	13	26
Frequency of Service (Minutes)	3.50	3.50	3.50
Wait Time @ Stop (1/2 Frequency)	1.75	1.75	1.75
Travel Time (1/2 One-Way Trip)	22.75	22.75	22.75
Typical Total Trip Time (Minutes)	24.50	24.50	24.50
Capacity			
Vehicles in Service	13	13	26
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	1,114	1,114	1,114
Passenger Capacity per Day	13,371	13,371	13,371
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	13	13	26
Days of Operation	1	1	1
Total Hours of Service	156	156	312
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$10,140	\$10,140	\$20,280

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle Bypass Road			
Time			
Route Length (Miles)	14.00	14.00	14.00
Average Speed @ MPH (<i>Without Stops</i>)	25	25	25
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	33.60	33.60	33.60
Number of Stops	10	10	10
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	40.60	40.60	40.60
Vehicles in Service	12	12	24
Frequency of Service (Minutes)	3.38	3.38	3.38
Wait Time @ Stop (1/2 Frequency)	1.69	1.69	1.69
Travel Time (1/2 One-Way Trip)	20.30	20.30	20.30
Typical Total Trip Time (Minutes)	21.99	21.99	21.99
Capacity			
Vehicles in Service	12	12	24
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	1,153	1,153	1,153
Passenger Capacity per Day	13,833	13,833	13,833
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	12	12	24
Days of Operation	1	1	1
Total Hours of Service	144	144	288
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$9,360	\$9,360	\$18,720

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle South			
Time			
Route Length (Miles)	13.50	13.50	13.50
Average Speed @ MPH <i>(Without Stops)</i>	26	26	26
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	31.15	31.15	31.15
Number of Stops	12	12	12
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	39.15	39.15	39.15
Vehicles in Service	12	12	24
Frequency of Service (Minutes)	3.26	3.26	3.26
Wait Time @ Stop (1/2 Frequency)	1.63	1.63	1.63
Travel Time (1/2 One-Way Trip)	19.58	19.58	19.58
Typical Total Trip Time (Minutes)	21.21	21.21	21.21
Capacity			
Vehicles in Service	12	12	24
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	1,195	1,195	1,195
Passenger Capacity per Day	14,343	14,343	14,343
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	12	12	24
Days of Operation	1	1	1
Total Hours of Service	144	144	288
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$9,360	\$9,360	\$18,720

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Satellite Park-and-Ride Shuttle North			
Time			
Route Length (Miles)	15.20	15.20	15.20
Average Speed @ MPH (<i>Without Stops</i>)	39	39	39
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	23.38	23.38	23.38
Number of Stops	3	3	3
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	28.38	28.38	28.38
Vehicles in Service	15	15	30
Frequency of Service (Minutes)	1.89	1.89	1.89
Wait Time @ Stop (1/2 Frequency)	0.95	0.95	0.95
Travel Time (1/2 One-Way Trip)	14.19	14.19	14.19
Typical Total Trip Time (Minutes)	15.14	15.14	15.14
Capacity			
Vehicles in Service	15	15	30
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	2,061	2,061	2,061
Passenger Capacity per Day	24,732	24,732	24,732
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	15	15	30
Days of Operation	1	1	1
Total Hours of Service	180	180	360
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$11,700	\$11,700	\$23,400

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Satellite Park-and-Ride Shuttle South			
Time			
Route Length (Miles)	14.20	14.20	14.20
Average Speed @ MPH <i>(Without Stops)</i>	39	39	39
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	21.85	21.85	21.85
Number of Stops	3	3	3
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	26.85	26.85	26.85
Vehicles in Service	20	20	40
Frequency of Service (Minutes)	1.34	1.34	1.34
Wait Time @ Stop (1/2 Frequency)	0.67	0.67	0.67
Travel Time (1/2 One-Way Trip)	13.42	13.42	13.42
Typical Total Trip Time (Minutes)	14.09	14.09	14.09
Capacity			
Vehicles in Service	20	20	40
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	2,905	2,905	2,905
Passenger Capacity per Day	34,865	34,865	34,865
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	20	20	40
Days of Operation	1	1	1
Total Hours of Service	240	240	480
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200

Table 3.2 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 65 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Transportation Center 7:30 a.m. – 7:30 p.m.	
Williamsburg Transportation Center Shuttle			
Time			
Route Length (Miles)	13.00	13.00	13.00
Average Speed @ MPH (<i>Without Stops</i>)	26	26	26
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	30.00	30.00	30.00
Number of Stops	2	2	2
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	34.00	34.00	34.00
Vehicles in Service	10	10	10
Frequency of Service (Minutes)	60.00	60.00	60.00
Wait Time @ Stop (1/2 Frequency)	0.50	0.50	0.50
Travel Time (1/2 One-Way Trip)	15.00	15.00	15.00
Typical Total Trip Time (Minutes)	15.50	15.50	15.50
Capacity			
Vehicles in Service	12	12	12
Vehicle Capacity (Seated + Standing)	65	65	65
Passenger Capacity per Hour	650	650	650
Passenger Capacity per Day	7,800	7,800	7,800
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	4	3	7
Days of Operation	1	1	1
Total Hours of Service	48	36	84
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$3,120	\$2,340	\$5,460

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Colonial Williamsburg/Jamestown Shuttle			
Time			
Route Length (Miles)	9.20	9.20	9.20
Average Speed @ MPH <i>(Without Stops)</i>	39	39	39
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	14.15	14.15	14.15
Number of Stops	2	2	2
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	18.15	18.15	18.15
Vehicles in Service	5	5	10
Frequency of Service (Minutes)	3.63	3.63	3.63
Wait Time @ Stop (1/2 Frequency)	1.82	1.82	1.82
Travel Time (1/2 One-Way Trip)	9.08	9.08	9.08
Typical Total Trip Time (Minutes)	10.89	10.89	10.89
Capacity			
Vehicles in Service	5	5	10
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	740	740	740
Passenger Capacity per Day	8,926	8,926	8,926
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	5	5	10
Days of Operation	1	1	1
Total Hours of Service	60	60	120
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$3,900	\$3,900	\$7,800

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle North			
Time			
Route Length (Miles)	15.00	15.00	15.00
Average Speed @ MPH (<i>Without Stops</i>)	24	24	24
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	37.50	37.50	37.50
Number of Stops	12	12	12
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	45.50	45.50	45.50
Vehicles in Service	22	22	44
Frequency of Service (Minutes)	2.07	2.07	2.07
Wait Time @ Stop (1/2 Frequency)	1.03	1.03	1.03
Travel Time (1/2 One-Way Trip)	22.75	22.75	22.75
Typical Total Trip Time (Minutes)	23.78	23.78	23.78
Capacity			
Vehicles in Service	22	22	44
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	1,310	1,310	1,310
Passenger Capacity per Day	15,666	15,666	15,666
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	22	22	44
Days of Operation	1	1	1
Total Hours of Service	264	264	528
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$17,160	\$17,160	\$34,320

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle Bypass Road			
Time			
Route Length (Miles)	14.00	14.00	14.00
Average Speed @ MPH <i>(Without Stops)</i>	25	25	25
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	33.60	33.60	33.60
Number of Stops	10	10	10
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	40.60	40.60	40.60
Vehicles in Service	20	20	40
Frequency of Service (Minutes)	2.03	2.03	2.03
Wait Time @ Stop (1/2 Frequency)	1.02	1.02	1.02
Travel Time (1/2 One-Way Trip)	20.30	20.30	20.30
Typical Total Trip Time (Minutes)	21.32	21.32	21.32
Capacity			
Vehicles in Service	20	20	40
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	1,330	1,330	1,330
Passenger Capacity per Day	15,961	15,961	15,961
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	20	20	40
Days of Operation	1	1	1
Total Hours of Service	240	240	480
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Hotel Shuttle South			
Time			
Route Length (Miles)	13.50	13.50	13.50
Average Speed @ MPH (<i>Without Stops</i>)	26	26	26
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	31.15	31.15	31.15
Number of Stops	12	12	12
Minutes per Stop	0.50	0.50	0.50
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	39.15	39.15	39.15
Vehicles in Service	20	20	40
Frequency of Service (Minutes)	1.96	1.96	1.96
Wait Time @ Stop (1/2 Frequency)	0.98	0.98	0.98
Travel Time (1/2 One-Way Trip)	19.58	19.58	19.58
Typical Total Trip Time (Minutes)	20.56	20.56	20.56
Capacity			
Vehicles in Service	20	20	40
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	1,380	1,380	1,380
Passenger Capacity per Day	16,552	16,552	16,552
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	20	20	40
Days of Operation	1	1	1
Total Hours of Service	240	240	480
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Satellite Park-and-Ride Shuttle North			
Time			
Route Length (Miles)	15.20	15.20	15.20
Average Speed @ MPH <i>(Without Stops)</i>	39	39	39
One-Way Trip Time @ Minutes <i>(Without Stops)</i>	23.38	23.38	23.38
Number of Stops	3	3	3
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	28.38	28.38	28.38
Vehicles in Service	15	15	30
Frequency of Service (Minutes)	1.89	1.89	1.89
Wait Time @ Stop (1/2 Frequency)	0.95	0.95	0.95
Travel Time (1/2 One-Way Trip)	14.19	14.19	14.19
Typical Total Trip Time (Minutes)	15.14	15.14	15.14
Capacity			
Vehicles in Service	15	15	30
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	1,430	1,430	1,430
Passenger Capacity per Day	17,125	17,125	17,125
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	15	15	30
Days of Operation	1	1	1
Total Hours of Service	180	180	360
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$11,700	\$11,700	\$23,400

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Park-and-Ride 7:30 a.m. – 7:30 p.m.	
Satellite Park-and-Ride Shuttle South			
Time			
Route Length (Miles)	14.20	14.20	14.20
Average Speed @ MPH (<i>Without Stops</i>)	39	39	39
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	21.85	21.85	21.85
Number of Stops	3	3	3
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	26.85	26.85	26.85
Vehicles in Service	20	20	40
Frequency of Service (Minutes)	1.34	1.34	1.34
Wait Time @ Stop (1/2 Frequency)	0.67	0.67	0.67
Travel Time (1/2 One-Way Trip)	13.42	13.42	13.42
Typical Total Trip Time (Minutes)	14.09	14.09	14.09
Capacity			
Vehicles in Service	20	20	40
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	2,010	2,010	2,010
Passenger Capacity per Day	24,134	24,134	24,134
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	20	20	40
Days of Operation	1	1	1
Total Hours of Service	240	240	480
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 3 Hours AM	One Way to Surry 3 Hours PM	
Scotland Ferry Peak Bus Service			
Time			
Route Length (Surry County)	2.40	2.40	2.40
Average Speed	20	20	20
One-Way Trip Time	9.20	9.20	9.20
Number of Stops	2	2	2
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	12.20	12.20	12.20
Vehicles in Service	30	30	30
Frequency of Service	15	15	15
Ferries in Operation per Hour	4	4	4
Frequency per Ferry per Hour	15	15	15
Buses per Ferry	6	6	6
Buses per Hour	24	24	24
Hours of Operation	12	12	12
Capacity			
Vehicles in Service	30	30	30
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	1,080	1,080	1,080
Passenger Capacity per Three-Hour Period	3,240	3,240	3,240
Hours			
Hours of Service per Day per Bus	3.00	3.00	6
Vehicles in Service	24	24	24
Days of Operation	1	1	1
Total Vehicle-Hours of Service	72	72	144
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$195	\$195	\$780
Total Estimated Cost	\$5,850	\$5,850	\$11,700

Table 3.3 Service Characteristics for Proposed Jamestown 2007 Shuttle Bus Service – 45 Passenger Maximum Capacity (continued)

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown 7:00 a.m. – 7:00 p.m.	One Way to Transportation Center 7:30 a.m. – 7:30 p.m.	
Williamsburg Transportation Center Shuttle			
Time			
Route Length (Miles)	13.00	13.00	13.00
Average Speed @ MPH (<i>Without Stops</i>)	26	26	26
One-Way Trip Time @ Minutes (<i>Without Stops</i>)	30.00	30.00	30.00
Number of Stops	2	2	2
Minutes per Stop	1.00	1.00	1.00
Layover Minutes	2.00	2.00	2.00
One-Way Trip Time with Stops and Layover	34.00	34.00	34.00
Vehicles in Service	10	10	10
Frequency of Service (Minutes)	60.00	60.00	60.00
Wait Time @ Stop (1/2 Frequency)	0.50	0.50	0.50
Travel Time (1/2 One-Way Trip)	15.00	15.00	15.00
Typical Total Trip Time (Minutes)	15.50	15.50	15.50
Capacity			
Vehicles in Service	10	10	10
Vehicle Capacity (Seated + Standing)	45	45	45
Passenger Capacity per Hour	450	450	450
Passenger Capacity per Day	5,400	5,400	5,400
Hours			
Hours of Service per Day per Bus	12.00	12.00	12
Vehicles in Service	10	10	10
Days of Operation	1	1	1
Total Hours of Service	120	120	120
Costs			
Cost per Hour of Service	\$65.00	\$65.00	\$65.00
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$3,900	\$3,900	\$7,800

4.0 Traffic Operations for Jamestown 2007

4.0 Traffic Operations for Jamestown 2007

■ 4.1 Conclusions and Recommendations

In association with the commemoration of the 400th anniversary of the establishment of Jamestown, several major events are anticipated to attract from 15,000 to 30,000 visitors to the Jamestown/Williamsburg area. For these major commemorative events, more involved transportation measures have been recommended by the *Comprehensive Transportation Plan for Jamestown 2007*. Specifically, for two events with expected attendance of 15,000 to 30,000 visitors, implementation of frequent shuttle bus operations along major corridors has been recommended. Implementation of frequent shuttle bus service along the major corridors will enable a large number of visitors to access the Jamestown site without exceeding site parking and approach roadway capacities. However, the roadways along which the shuttle bus services are planned must be able to accommodate the vehicle frequencies and schedules. The *Comprehensive Transportation Plan for Jamestown 2007* report specifically identifies the capacity and operation of the U.S. 60 corridor as an area of concern, and recommends that a more detailed analysis be conducted.

This study evaluates the U.S. 60 (Richmond Road) corridor for operational issues that would potentially adversely affect the shuttle bus service. The corridor comprises three segments:

1. Richmond Road (Centerville Road to Bypass Road);
2. Bypass Road/Page Street (Richmond Road to York Street); and
3. York Street/Pocahontas Trail (Page Street to Busch Gardens).

To evaluate operational conditions, five data items were collected at major intersections and along each corridor segment:

- Roadway geometry;
- Daily volumes;
- Turning movement counts;
- Intersection geometry and capacity; and
- Travel times on selected roadway segments.

Using these data and capacity analysis procedures, existing conditions along the corridor under normal, p.m. peak-hour traffic was determined. In general, conditions were found to be adequate, with congestion occurring at three locations:

- Richmond Road between Ironbound Road and Bypass Road;
- Bypass Road between Waller Mill Road and Palace Lane; and
- York Street at Page Street and Lafayette Street.

Moreover, while not currently congested, conditions at two locations were found to exhibit the potential to affect bus service.

To address the potential for shuttle bus operation to be adversely affected by traffic conditions at these locations, a range of traffic control measures were considered and evaluated. These include:

- Traffic signal pre-emption;
- Traffic signal timing and phasing adjustments;
- Intersection turn-lane modifications;
- Dedicated bus lanes and bus stop locations; and
- Manual traffic control.

Traffic signal pre-emption and dedicated bus lanes were not found to be effective in addressing the location-specific congestion occurring along the corridor. Furthermore, installation of these measures has the potential to create access issues affecting abutting land uses. Intersection turn-lane modification was found to be potentially applicable only at the York Street intersection with Page Street. However, any modifications were not found to improve traffic flow.

Traffic signal timing and phasing modification was found to be suitable to address congestion issues in the area of the closely spaced signals at Richmond Road between Ironbound Road and Bypass Road and at Bypass Road between Waller Mill Road and Palace Lane.

Manual traffic control at signalized intersections was found to be suitable for the congested intersections at Richmond Road and Ironbound Road, at Bypass Road and SR 132, and at York Street and Page Street. Finally, manual traffic control at an unsignalized intersection was found to be suitable at Pocahontas Trail and the SR 199 westbound on-ramp.

The evaluation does not take into account several development proposals that have been approved and that will be in place by 2007. The most important of these is the addition of 400,000 square feet of retail development between Ironbound Road and Bypass Road. The Phase III report will examine these specific development issues in a more detailed analysis.

Recommendations

To address congested conditions on the U.S. 60 corridor that have the potential to adversely affect shuttle bus operations in association with Jamestown 2007 major events, the following actions are recommended (see Figure 4.1):

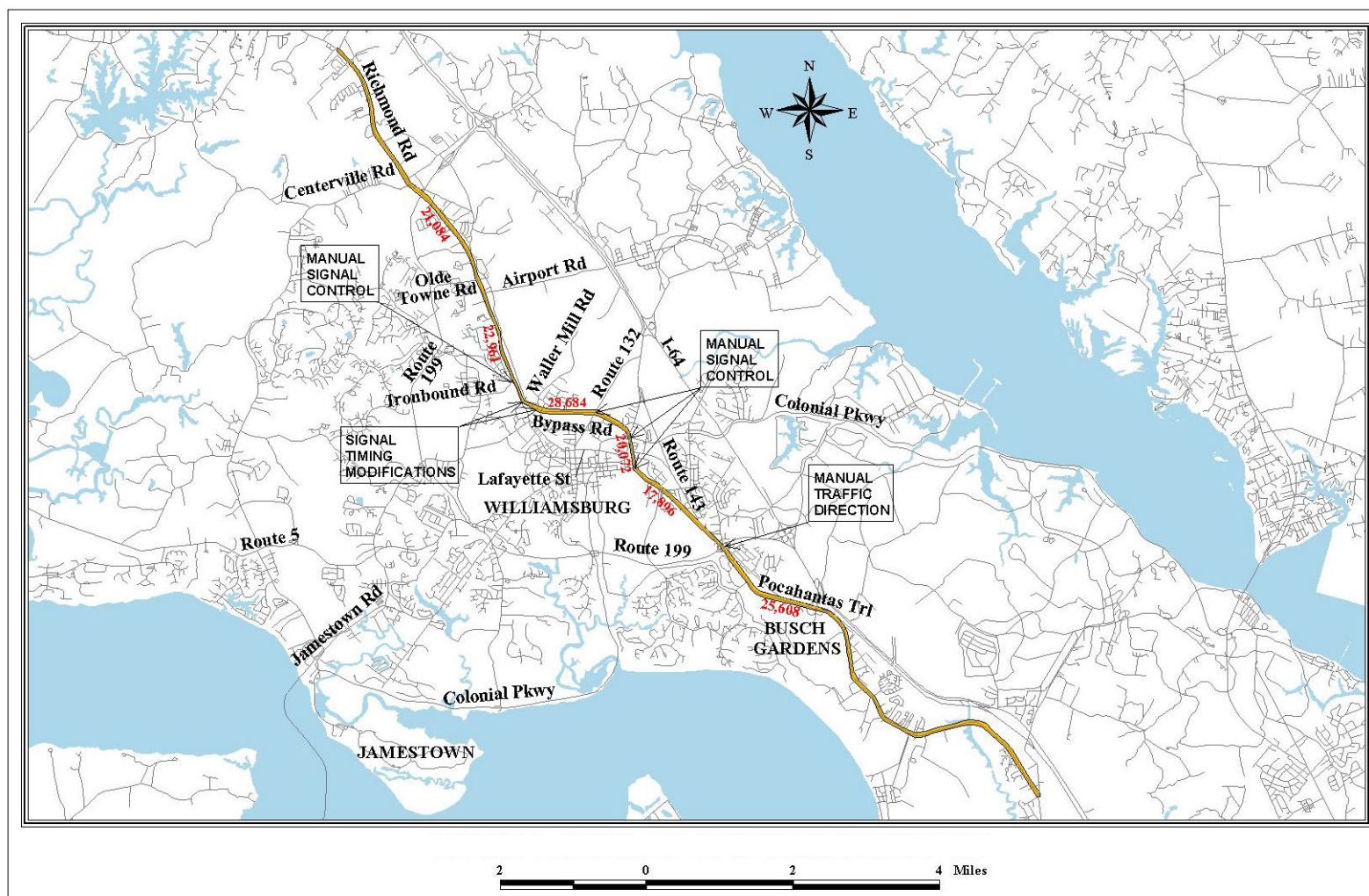
1. Modify the traffic signal timings and phasing offsets on Richmond Road at the Ironbound Road and Bypass Road signals;
2. Modify the traffic signal timings and phasing offsets on Bypass Road at the Waller Mill Road and Palace Lane signals;
3. Implement manual control of the traffic signal controller at the following locations:
 - Richmond Road at Ironbound Road,
 - Bypass Road at SR 132,
 - York Street at Page Street, and
 - Page Street at Second Street; and
4. Implement manual traffic direction at the intersection of Pocahontas Trail at the west-bound SR 199 on-ramp.

■ 4.2 Introduction

To address the transportation needs associated with Jamestown 2007, a study of methods to address forecasted visitor impacts of the *Comprehensive Transportation Plan for Jamestown 2007* was conducted. The study recommended measures for visitor mobility commensurate with the magnitude of visitor traffic anticipated with each type of event. While most of the commemorative events are forecasted to attract a relatively small number of attendees, several major events are anticipated that will attract from 15,000 to 30,000 visitors. For these few major commemorative events, more involved transportation measures have been recommended. Specifically, for two events with expected attendance of 15,000 to 30,000 visitors, implementation of frequent shuttle bus operations along major corridors has been recommended.

The implementation of frequent shuttle bus service along the major corridors will enable a large number of visitors to access the Jamestown site without exceeding site parking and approach roadway capacities. However, the roadways along which the shuttle bus services are planned must be able to accommodate anticipated vehicle frequencies and schedules. The *Comprehensive Transportation Plan for Jamestown 2007* report specifically identifies the capacity and operation of the U.S. 60 corridor as an area of concern, and recommends that a more detailed analysis be conducted. The analysis should emphasize the operation of the roadway, and identify measures to improve service with the addition of the shuttle buses.

Figure 4.1 Summary of Recommendations



To implement this recommendation, a study of the operational characteristics of the U.S. 60 corridor was conducted. The purpose of this section is to present the methodology, findings, conclusions, and recommendations of the study. Following this introduction, existing conditions – including traffic volumes, travel times, and intersection service levels – will be documented. Next, existing operational deficiencies will be identified and defined. The final section will develop and evaluate alternative improvements to address deficiencies. These improvements will focus on low-capital intensive, operational measures specifically intended to improve through service for shuttle bus traffic. Conclusions and recommended actions were presented in Section 4.1.

■ 4.3 Existing Conditions

The general location of the corridor is shown in Figure 4.2. The study area includes the segments of U.S. 60 along which shuttle bus service is recommended for the more heavily attended commemorative events. It generally includes segments from the intersection of SR 614 (Centerville Road) in the west to the ramp intersection with the SR 199 interchange to the east. Five data items for existing conditions were collected. These are:

- Roadway geometry;
- Daily volumes;
- Turning movement counts;
- Intersection geometry and capacity; and
- Travel times on selected roadway segments.

Roadway and Intersection Geometry

U.S. 60 provides motorists with a variety of pavement sections and posted speed limits, as it runs through the three jurisdictions in the corridor study area. The roadway geometry and posted speed limits along the major segments are summarized in Table 4.1. As Table 4.1 shows, the roadway is generally posted at slower speed limits within the Williamsburg city limits. The slower posted speed limits are not related to the quality of the pavement section. West Richmond Road in Williamsburg has a five-lane pavement section with a posted speed limit of 25 mph. The same pavement section on Bypass Road in York County has a posted limit of 35 mph, and on Pocahontas Trail in York County the five-lane section has a posted limit of 45 mph. There is consistency along the short, two-lane segments where all speed limits are posted at 25 mph.

Figure 4.2 U.S. 60 Corridor Location

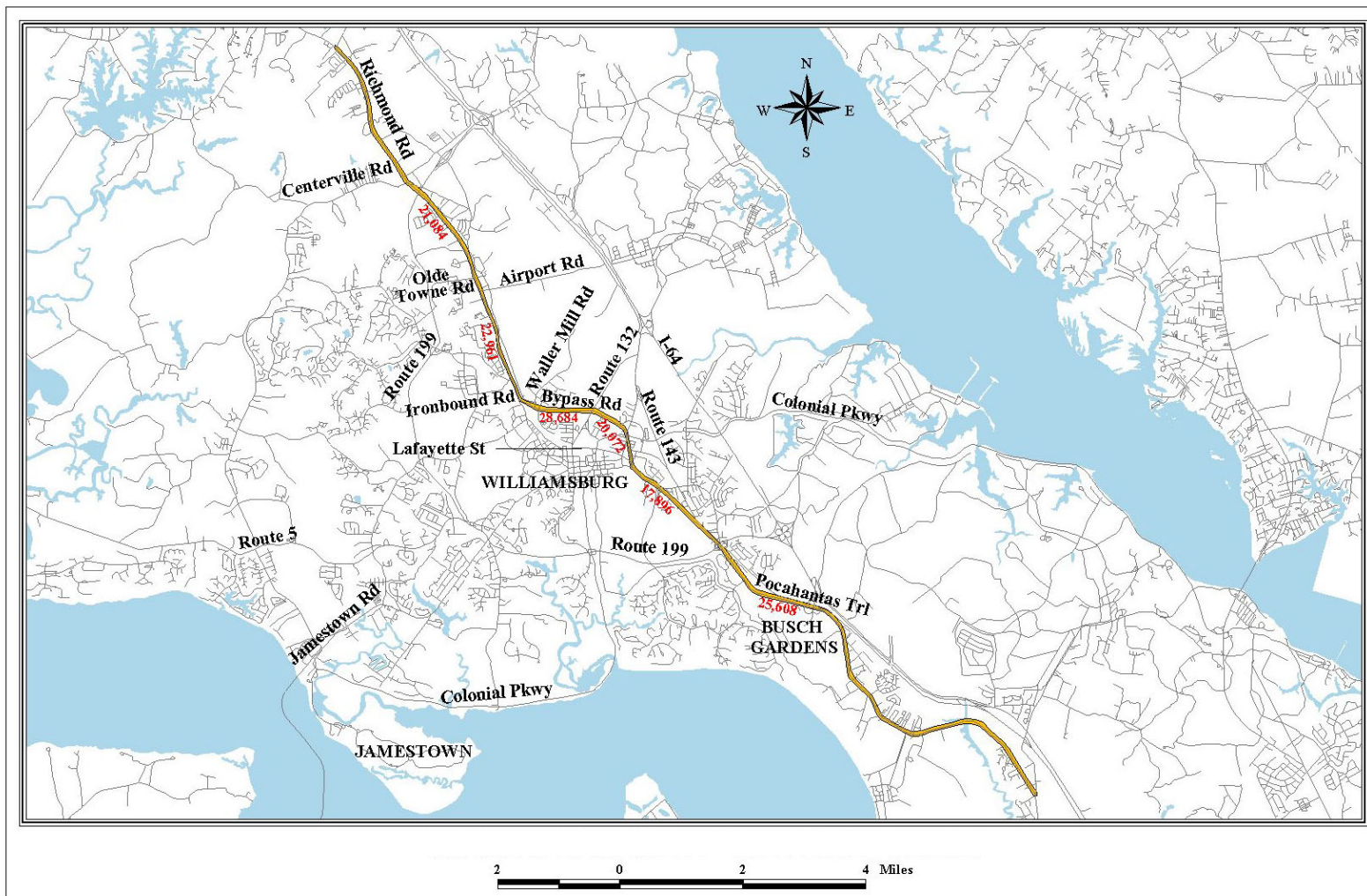


Table 4.1 Summary of Speed Limits and Pavement Sections along U.S. 60

From	To	Speed Limit (mph)	Pavement Section
Centerville Road	Williamsburg NCL	45	Four-Lane Divided
Williamsburg NCL	Williamsburg Motor Court	35	Four-Lane Divided
Williamsburg Motor Court	Bypass Road	25	Five Lane*
Bypass Road	SR 132	35	Five Lane*
SR 132	Page Street	35	Four Lane
Page Street	York Street	25	Four Lane
York Street	York WCL	25	Two Lane
York WCL	SR 199	45	Five Lane*
SR 199	Busch Gardens	45	Four-Lane Divided

* Includes two-way center left-turn lane.

Daily Volumes

The Virginia Department of Transportation has collected traffic volume data along major segments of U.S. 60 through James City County, York County, and the city of Williamsburg. The volumes were collected during spring and summer months to reflect the higher traffic volumes associated with the region's tourist attractions. The volumes show that the heaviest traffic occurs along the eastern segments of Richmond Road, with the heaviest volume (32,730) recorded between Ironbound Road and the west city limits of Williamsburg. Heavy volumes were also recorded on Bypass Road near Waller Mill and on Pocahontas Trail east of the SR 199 interchange.

Along Bypass Road east of Richmond Road, the volumes generally range from 28,684 vehicles in the vicinity of Waller Mill Road to 20,072 south of the SR 132 intersection. Along the two-lane segment of York Street, adjacent to the restored area of Colonial Williamsburg, the volume is 17,894. Moving east along Pocahontas Trail, this volume increases to 20,180 approaching the SR 199 interchange. To the east of SR 199, the volumes approaching Busch Gardens increase to 25,608 vehicles.

Turning Movement Counts

P.M. peak-period vehicle turning movement counts were collected at the following intersections:

- Centerville Road at Richmond Road;
- Bypass Road at Richmond Road;
- Olde Towne at Richmond Road;
- Henry Street at Bypass Road;
- Lafayette Street at Henry Street;
- SR 199 Ramp at Pocahontas Trail (1);
- SR 199 Ramps to Richmond Road (2);
- Ironbound Road at Richmond Road;
- Waller Mill Road at Bypass Road;
- Palace Lane at Bypass Road;
- York Street at Page Street; and
- Second Street at Page Street.

The peak-hour vehicle turning movement volumes are shown on Figures 4.3 through 4.5 for the Richmond Road, Bypass Road, and Pocahontas Trail segments of the U.S. 60 corridor.

Intersection Geometry and Capacity

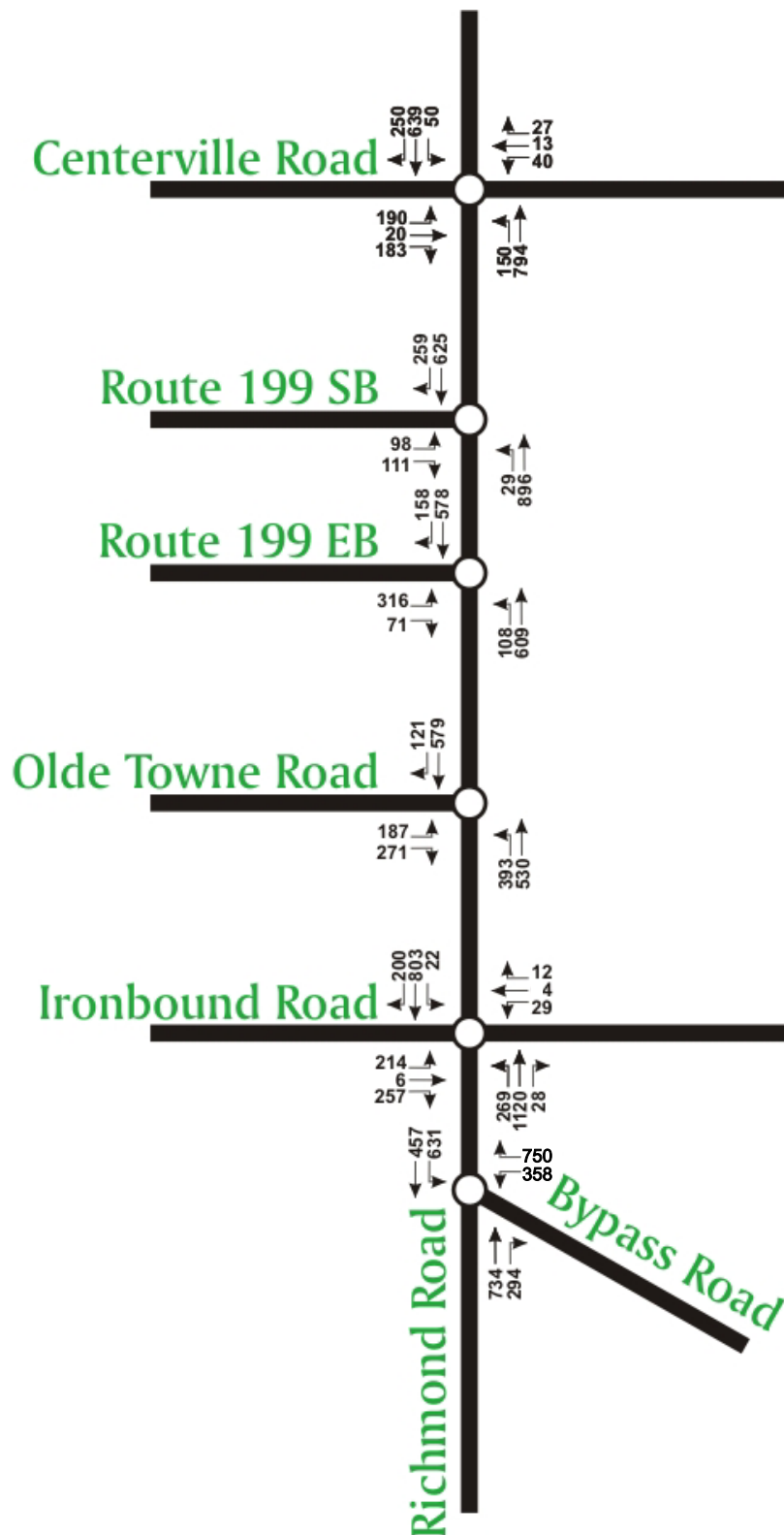
To evaluate the performance of the major signalized intersections along the corridor, capacity analyses were performed using the volumes shown in Figures 4.3 through 4.5, the existing intersection geometry, and traffic signal timing and phasing. The results of the analysis are summarized in Tables 4.2 through 4.4.

Richmond Road Corridor

The results in Table 4.2 for the Richmond Road corridor show that, for the most part, motorists completing through traffic movements along eastbound and westbound Richmond Road are confronted by moderate delays at the signalized intersections. Service generally ranges in the A to B levels. The exception occurs in the more congested areas of Richmond Road in the city of Williamsburg, at the intersections with Bypass Road and with Ironbound Road. On the eastbound Richmond Road approach to Ironbound Road, the through movement is opposed by an eastbound left-turn movement with a relatively heavy volume. As a result, the amount of “green time” the traffic signal allocates to the eastbound through movement is much less than that available for the westbound through movements. Consequently, the eastbound through service level is C with average vehicle delays computed at 27.7 seconds.

More substantial delays are exhibited at the Richmond Road intersection with Bypass Road where the heavy volumes on eastbound Richmond Road turning left to Bypass Road are opposed by a substantial volume of westbound through moving vehicles. Moreover, the southbound Bypass Road left-turn volume of 358 vehicles is constrained to a single turn lane. Consequently, the service levels for vehicles moving from eastbound Richmond Road to Bypass Road average a delay of 28 seconds, and the vehicles moving through the intersection on westbound Richmond Road average a delay of 37 seconds, with a service level of D.

Figure 4.3 P.M. Peak-Hour Turning Movement Volume
Richmond Road



NOT TO SCALE

Figure 4.4 P.M. Peak-Hour Turning Movement Volume
Bypass Road/Page Street

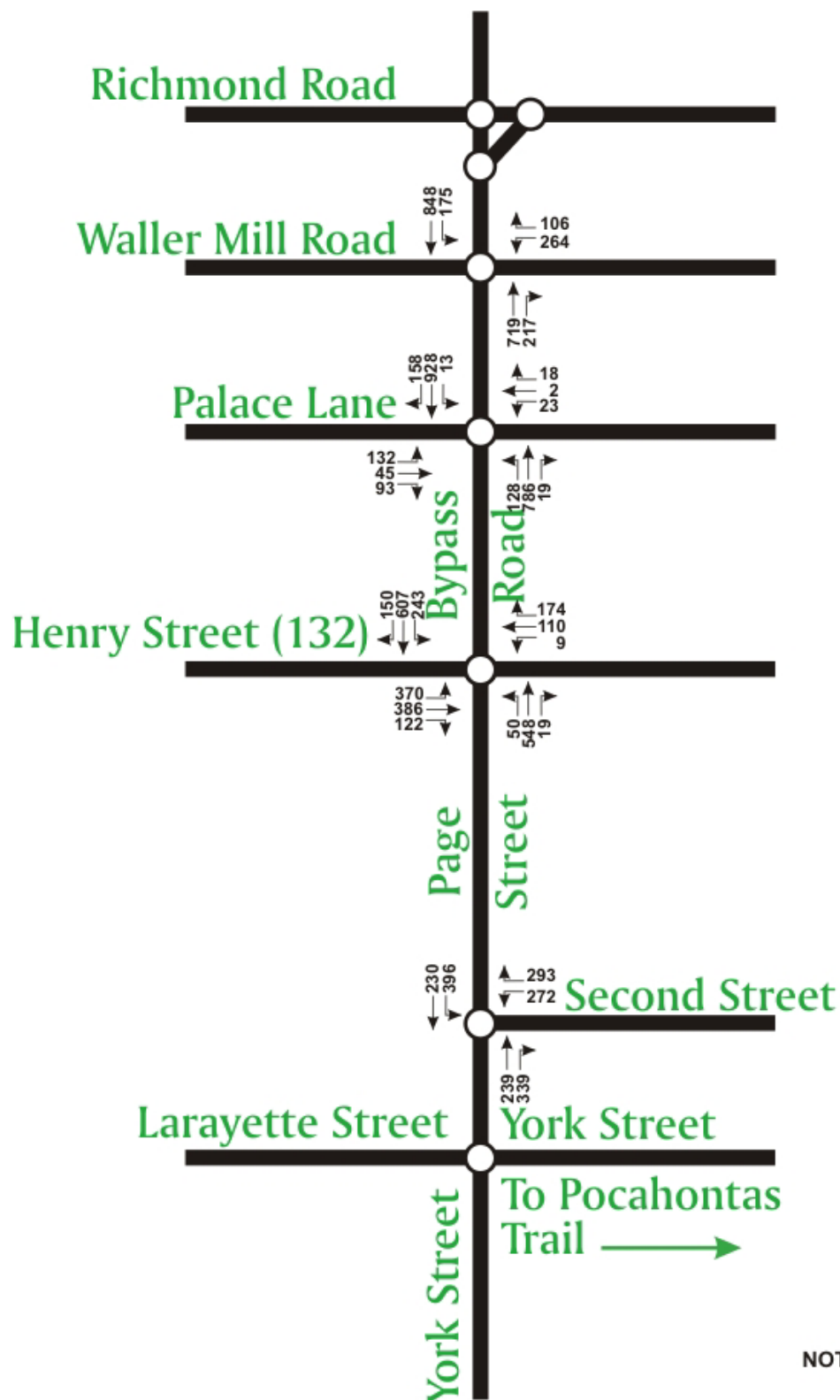
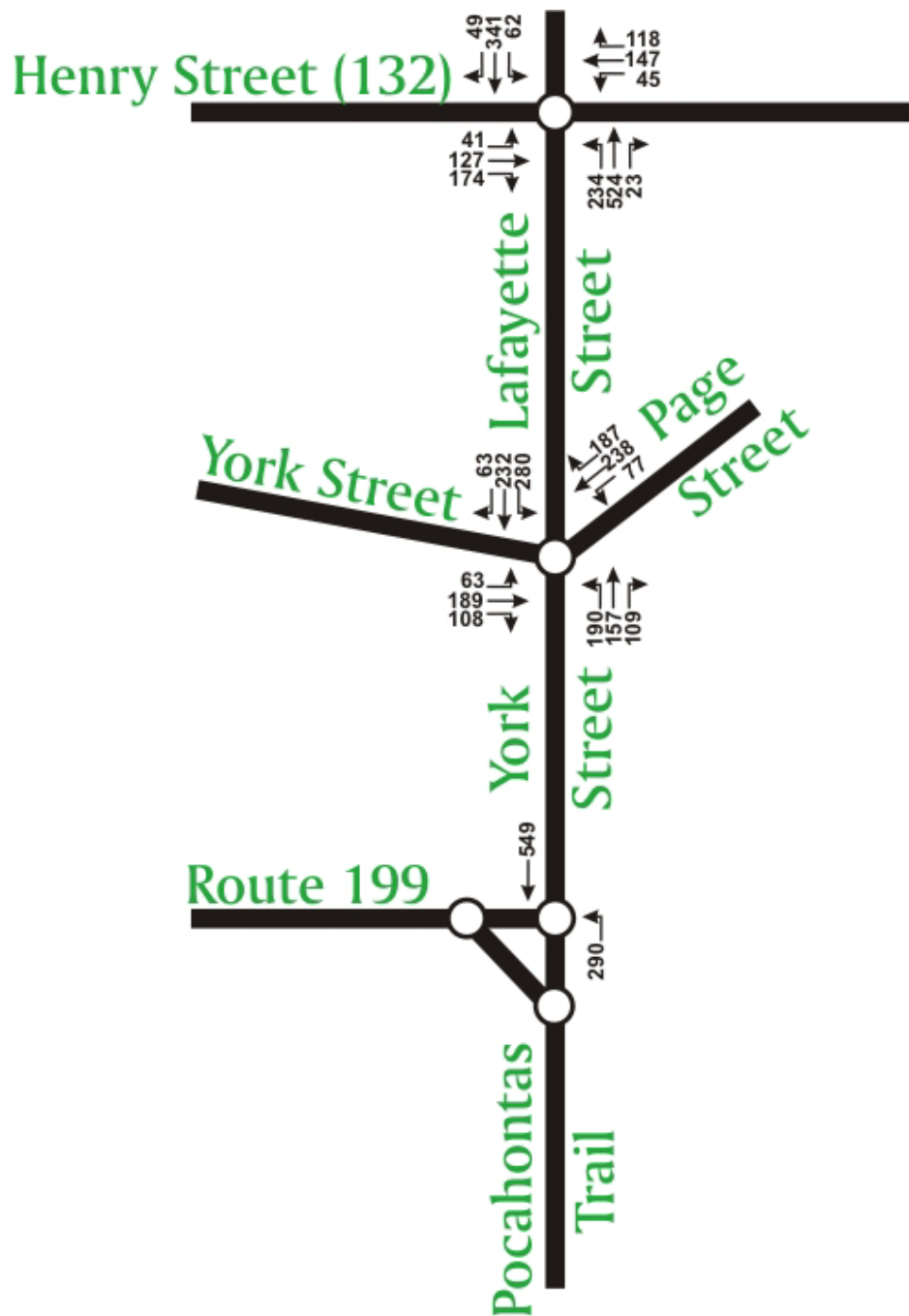


Figure 4.5 P.M. Peak-Hour Turning Movement Volume
Pocahontas Trail



NOT TO SCALE

**Table 4.2 Summary of Capacity Analysis:
U.S. 60-Richmond Road Corridor**

Intersection	Approach	Movement	Volume	Level of Service	Average Delay (Seconds)
Bypass Road and Richmond Road	Westbound	Through	734	D	37.1
		Right	294	A	
	Eastbound	Left	631	C	28.1
		Through	457	A	19.6
	Southbound	Left	358	C	
Ironbound Road and Richmond Road	Westbound	Right	750	B	15.2
		Left	269	D	
	Eastbound	Through/Right	1,148	B	11.5
		Left	22	D	
		Through	803	C	27.7
	Northbound	Right	200	A	
		Left/Through	220	D	
	Southbound	Right	257	C	
Olde Towne Road and Richmond Road	Westbound	Left/Through/Right	45	D	
		Through	530	A	4.8
	Eastbound	Left	393	C	
		Through	579	B	18.3
	Northbound	Right	121	A	
SR 199 NB and Richmond Road	Westbound	Left	187	B	
		Right	271	A	
	Eastbound	Through	609	A	6.6
		Left	108	C	
	Northbound	Through	578	B	13.1
		Right	158	A	
SR 199 SB and Richmond Road	Westbound	Left	316	B	
		Right	71	A	
	Eastbound	Through	896	A	4.6
		Left	29	B	
	Northbound	Through	625	A	5.7
		Right	259	A	
Centerville Road and Richmond Road	Westbound	Left	98	B	
		Right	111	A	
	Eastbound	Through	794	B	13.0
		Left	150	C	
	Northbound	Left	50	C	
		Through	639	B	16.7
	Southbound	Right	250	A	
		Through/Left	20-120	F	
	Northbound	Right	183	A	
		Through/Left	13-40	C	
	Southbound	Right	27		

**Table 4.3 Summary of Capacity Analysis:
U.S. 60-Bypass Road/Page Street Corridor**

Intersection	Approach	Movement	Volume	Level of Service	Average Delay (Seconds)
Waller Mill Road and Bypass Road	Southbound	Through/Left	0-264	B	
		Right	106	A	
	Eastbound	Left	175	D	
		Through/Right	848-0	B	11.8
	Westbound	Through/Left	0-719	C	21.8
Palace Lane and Bypass Road	Northbound	Through/Left	45-132	B	
		Right	93	A	
	Southbound	Through/Right/Left	2-18-23	B	
	Eastbound	Left	13	B	
		Through	928	B	16.0
	Westbound	Right	158	A	
		Left	128	B	
	Through	786	B	14.1	
	Right	19	A		
SR 132 and Bypass Road	Northbound	Left	370	C	
		Through	386	C	
		Right	122	A	
	Southbound	Left	9	D	
		Through/Right	110-174	B	
	Eastbound	Left	243	D	
		Through	607	C	22.2
	Westbound	Right	150	B	
		Left	50	D	
Through		548	C	29.6	
Second Street and Page Street	Northbound	Right	19	C	
		Through	239	B	19.3
	Southbound	Right	339	A	
		Left	396	C	
	Westbound	Through	230	B	17.7
		Left	272	B	
		Right	293	A	

**Table 4.4 Summary of Capacity Analysis:
U.S. 60-York Street/Pocahontas Trail Corridor**

Intersection	Approach	Movement	Volume	Level of Service	Average Delay (Seconds)
Lafayette Street and Henry Street	Northbound	Through/Right	524-23	A	9.4
		Left	234	C	
	Southbound	Through/Right	341-49	B	16.3
		Left	62	C	
	Eastbound	Left	41	B	
		Through	127	B	
		Right	174	A	
	Westbound	Left	45	B	
		Through	147	B	
		Right	118	A	
York Street and Page Street	Northbound	Left	190	B	19.7
		Through	157	B	
	Southbound	Left	280	B	21.5
		Through/Right	232-63	C	
	Eastbound	Through/Left	189-63	C	
		Right	108	A	
	Westbound	Left	77	C	
		Through/Right	187	A	
SR 199 and Pocahontas Trail	Northbound	Left	290	C	12.1
	Southbound	Through	549	B	

Bypass Road/Page Street Corridor

The Bypass Road/Page Street corridor of U.S. 60 extends from the Richmond Road intersection with Bypass Road to the Page Street intersection with York Street and Lafayette Street. In general, the signalized intersections are isolated, and traffic volumes move with only a moderate level of delay.

The other location where service is lower is the intersection of Bypass Road and SR 132. Here, westbound through volumes exhibit averages delays of 29.6 seconds. Here again, the longer delay is a product of relatively high volume of opposing left-turn movement. The westbound through level of service is C.

York Street/Pocahontas Trail Corridor

To the east of Williamsburg, the U.S. 60 corridor is bounded by York Street within the city limits of Williamsburg and Pocahontas Trail in York and James City Counties. In addition, the intersection of Lafayette and Henry Streets was added to the analysis for information on conditions accessing the Visitors Center and Colonial Parkway.

In general, during p.m. peak-hour conditions, none of the intersection movements exhibit delays that could be considered excessive.

Travel Time Analysis

During the p.m. peak period, samples of travel times along the U.S. 60 corridor were collected for the following segments:

- Richmond Road – from Lightfoot Road to Bypass Road;
- Bypass Road – from Richmond Road to Page Street; and
- Pocahontas Trail/York Street/Lafayette Street – from Busch Gardens to Henry Street.

Travel time data was collected for five trips in each direction, and times at intermediate intersections were recorded. Using this data, average travel times and speeds for the corridor and for each segment were computed. It should be noted that each of these corridors has varying speed limits.

Summarized on Figure 4.6, the Richmond Road corridor was congested on the east in the city of Williamsburg. The slower travel times associated with the congestion are primarily focused in the area of the Ironbound Road and Bypass Road intersections. Segments to the west exhibited little congestion, and travel times were not affected by traffic volumes. The one exception occurs at the traffic signal at the Centerville Road intersection. In the congested areas, free-flow speeds were unattainable.

The Bypass Road corridor travel times are summarized on Figure 4.7. This exhibited corridor was congested from Richmond Road through Palace Lane and at the Second Street intersection. In the congested areas, free-flow speeds were unattainable. In contrast, from east of Palace Lane to Second Street, there was no congestion and vehicles generally moved at free-flow speeds.

The findings of the analysis of the Pocahontas Trail/York Street/Lafayette Street corridor are shown on Figure 4.8. Throughout this corridor there is very little congestion and the only delays occur at traffic signals. Free-flow conditions are generally maintained along this corridor.

Figure 4.6 Richmond Road Travel Times

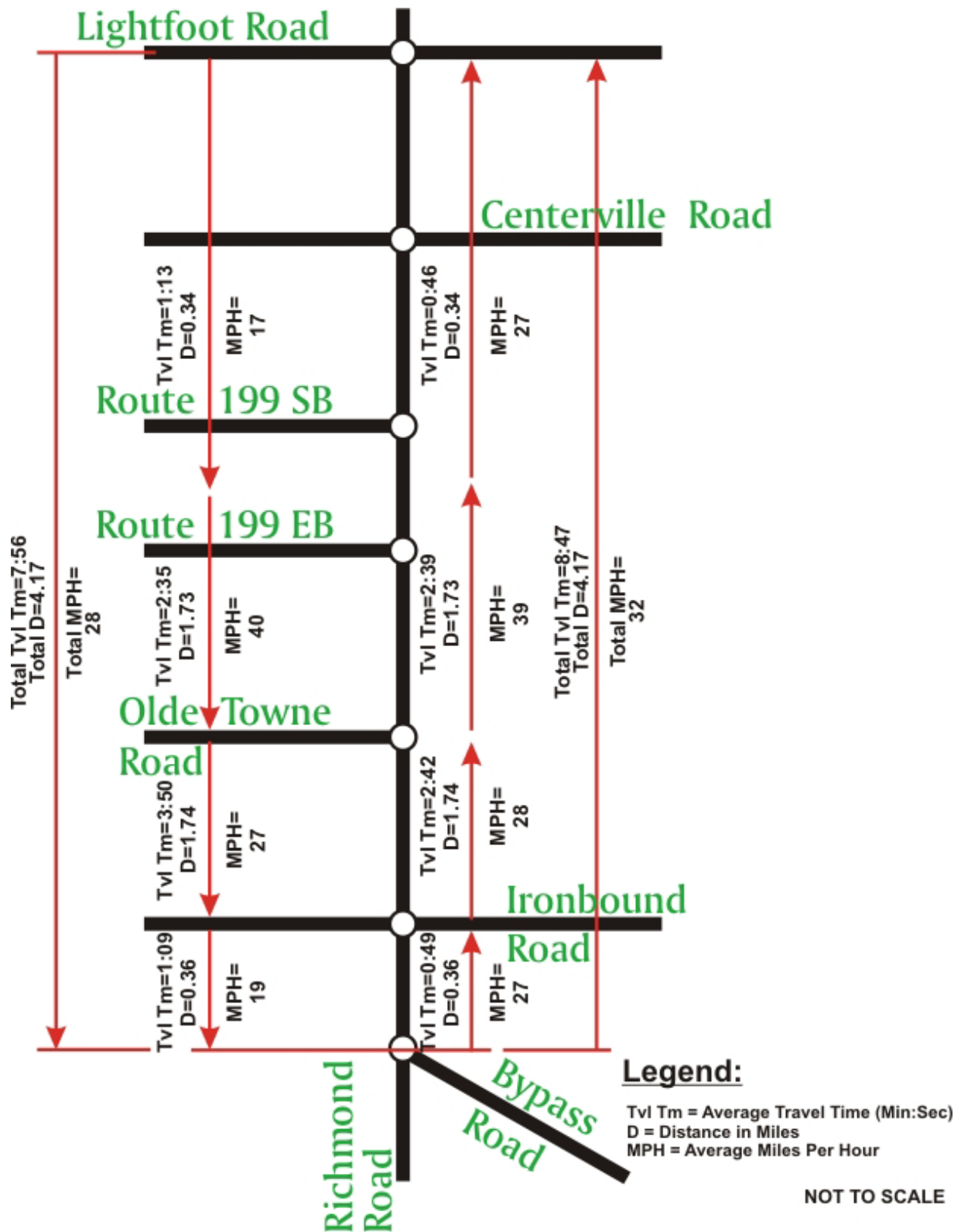


Figure 4.7 Bypass Road Travel Times

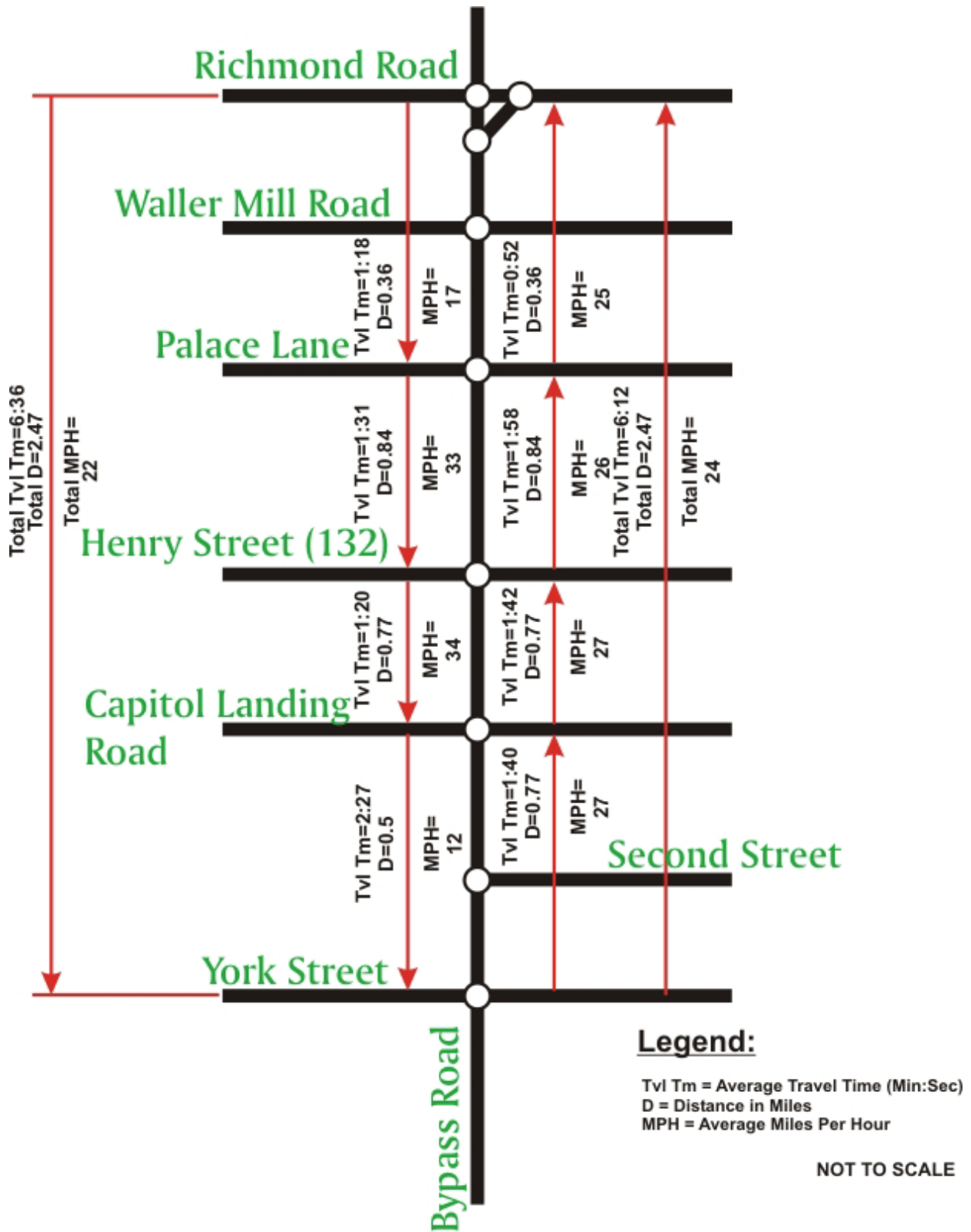
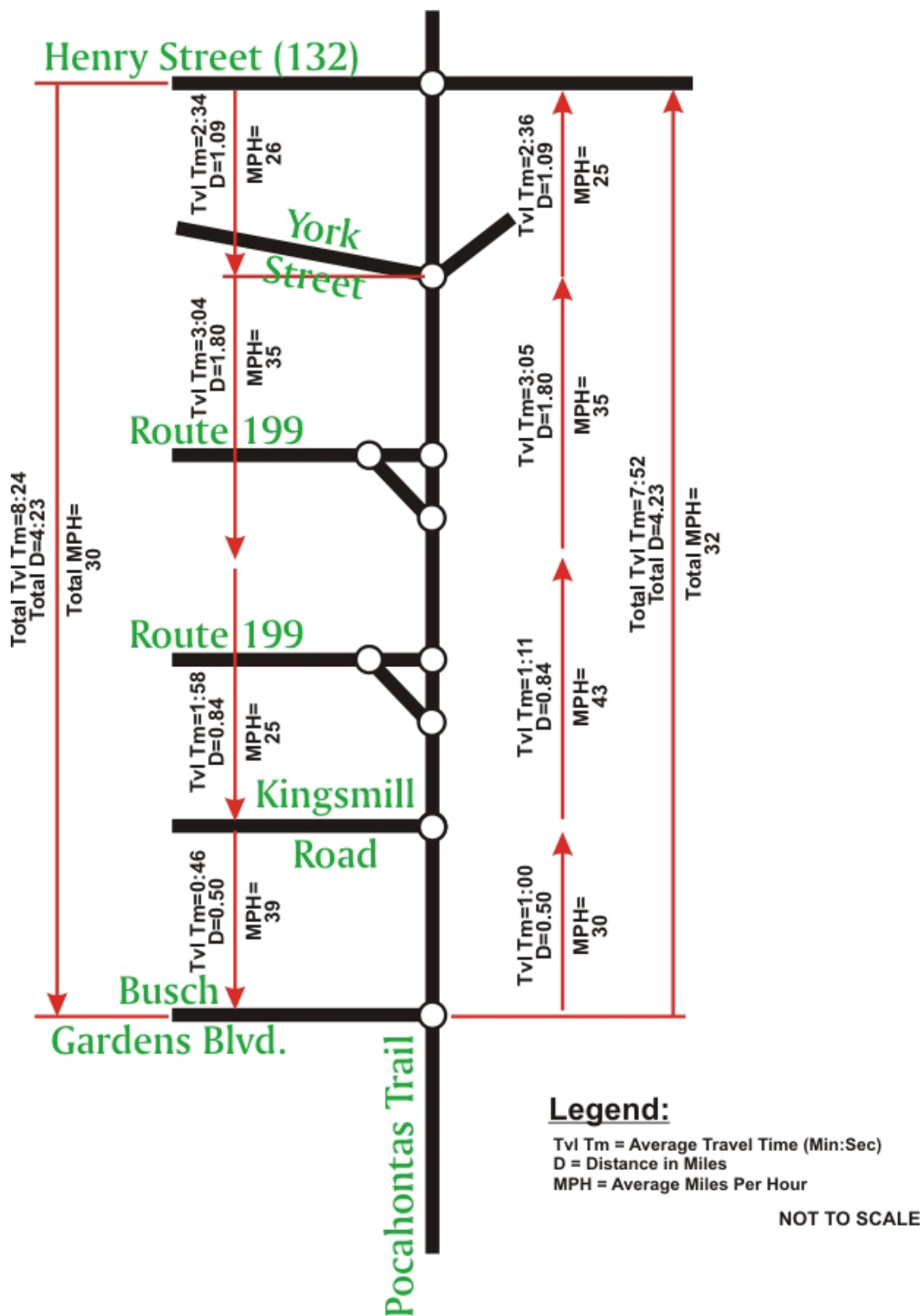


Figure 4.8 Pocahontas Trail Travel Times



■ 4.4 Inventory of Deficiencies

The U.S. 60 corridor in the Williamsburg vicinity generally provides adequate service for normal p.m. peak-hour traffic conditions. The analysis of intersection performance shows those vehicles completing through movements are confronted by average delays exceeding 20 seconds at only a few intersections. Moreover, the overall average speed of vehicles moving along the three corridor components (Richmond Road, Bypass Road, and Pocahontas Trail) range from 22 to 34 mph.

Planned Bus Routes

Jamestown 2007 has been developing a plan of bus routes for implementation with the occurrence of heavily attended commemorative events. Three of these routes focus on the U.S. 60 corridor (see Figure 4.9). The Bypass Bus Route begins on Bypass Road near Waller Mill Road, diverts to Merrimac Trail via Capitol Landing Road, and re-enters Page Street via Second Street. It then accesses Colonial Parkway via York Street and Francis Street.

The U.S. 60 North Bus Route begins at the intersection of Centerville Road and continues eastbound on Richmond Road through the Bypass Road intersection to access Colonial Parkway south of the restored area. The U.S. 60 South Bus Route begins at York Street and moves east to Pocahontas Trail. It accesses colonial Parkway via SR 199.

Along each route, planned frequency of service may vary with the capacity of the vehicle. Sixty-five-passenger vehicles will have headways of approximately 3.3 minutes and 40-passenger vehicles will have headways of approximately two minutes.

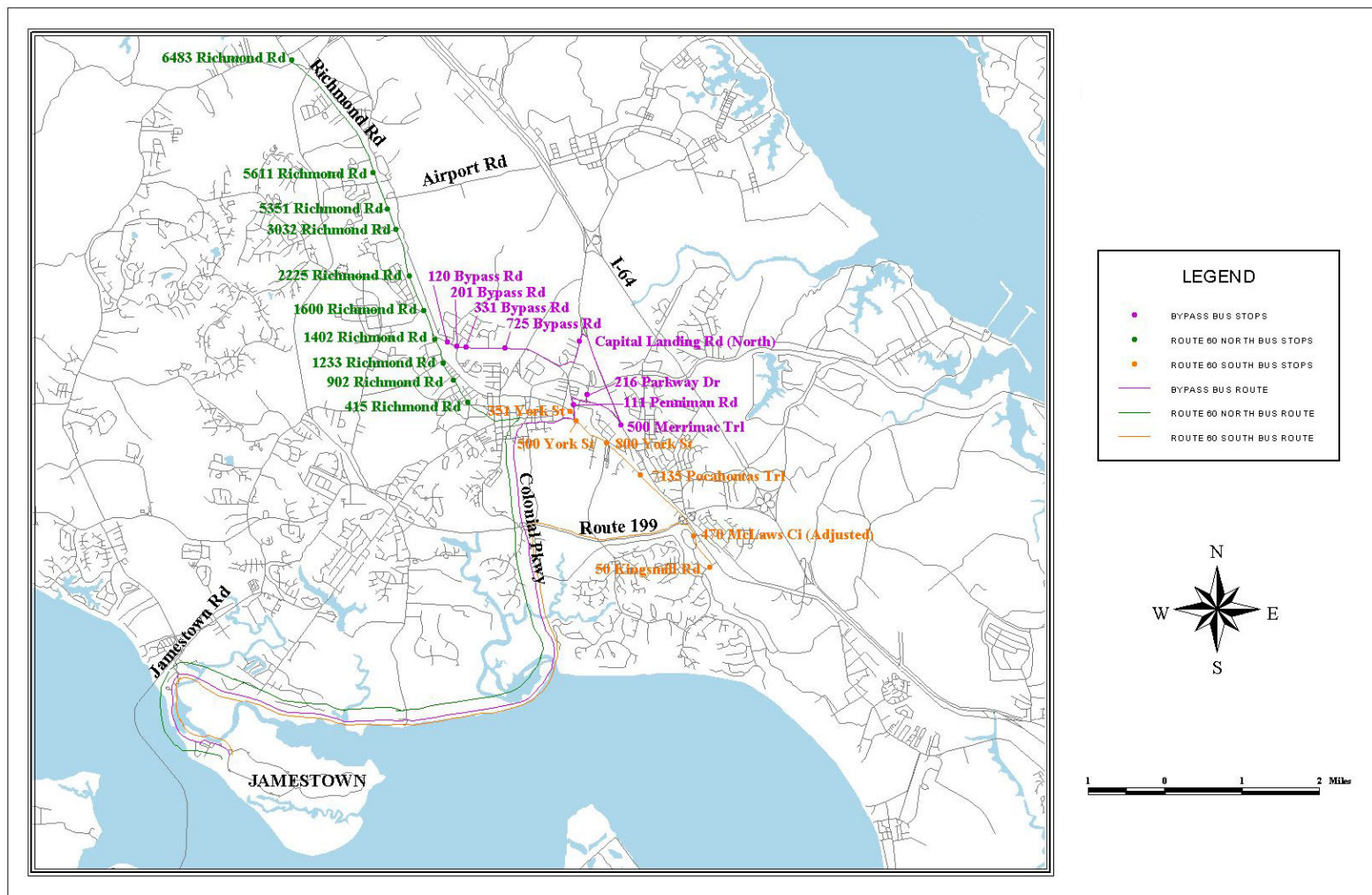
Bypass Bus Route

While not currently deficient, three locations on the Bypass Bus Route present potential congested situations for planned shuttle bus traffic. These are:

- Waller Mill Road and Palace Lane;
- SR 132; and
- Second Street and York Street.

Beginning in the west, the traffic signal system that includes Waller Mill Road and Palace Lane provides adequate service when evaluated individually. However, considering the close location, vehicle queues at each intersection have the potential to extend into the adjacent junction. Heavy traffic volumes can result in gridlock conditions for eastbound traffic from Palace Lane to the west and for westbound traffic from Waller Mill to the east.

Figure 4.9 Bus Stops and Routes



As an isolated intersection, SR 132 performs adequately. The volume of approaching vehicles is generally balanced. The potential deficiency that this intersection presents to shuttle bus operations is the delay resulting from higher than normal traffic volumes approaching from SR 132 (main access to Colonial Williamsburg from I-64).

At the Page Street (U.S. 60) intersection with York Street, vehicles on each approach do not exhibit excessive delays. However, with only single lanes accommodating major approach movements, lengthy vehicle queues are a problem. The westbound Page Street vehicle queue frequently extends beyond the bridge over the CSX railroad.

U.S. 60 North Bus Route

According to both the capacity analysis and the travel time data, the area of Richmond in the vicinity of Bypass Road and Ironbound Road presents deficient service for maintaining consistent shuttle bus service. This segment accommodates the heaviest volumes on the U.S. 60 corridor, and the traffic signal timings are structured to manage numerous heavy conflicting movements.

U.S. 60 South Bus Route

With the exception of the Page Street intersection with York Street described above, there were no deficiencies defined along this corridor. There are two potential deficiencies relating to consistent bus service. First, the length of the traffic signal cycle at the McLaws Circle (Busch Corporate Center) intersection with Pocahontas Trail produces lengthy delays for vehicles attempting to enter westbound U.S. 60. Second, to access the ramp to westbound SR 199 from westbound U.S. 60, vehicles must execute a left-turn movement without traffic control (unsignalized intersection).

■ 4.5 Alternative Improvements

To address the existing and potential deficiencies detailed above, a series of measures was evaluated. These included:

- Traffic signal pre-emption – Permits an approaching vehicle to remotely modify the phasing of one or more traffic signals so that the vehicle consistently receives a green indicator;
- Traffic signal timing and phasing adjustments – Changes to the existing timing controls on a traffic signal;
- Intersection turn-lane modifications – Changes in the assignment of movements to an intersection approach lane;

- Dedicated bus lanes and bus stop locations – Separate lanes or pull-outs for bus use only; and
- Manual traffic control – Either direction of traffic by police or operation of the traffic signal controller by police.

Evaluation

The areas of existing or potential deficiencies for planned shuttle bus service *do not occur throughout* any of the three corridor segments. For the most part, deficiencies are local and, with one exception (at Waller Mill Road and Palace Lane), are not related to adjacent intersections. Moreover, average corridor speeds are adequate for maintaining consistent bus service. Therefore, deficiencies are location specific and not corridor-wide.

Traffic Signal Pre-emption and Dedicated Bus Lane

Two of the improvement measures listed above are generally not effective in addressing deficiencies with location-specific characteristics. First, traffic signal pre-emption is most effective for either express bus or emergency vehicle service. By clearing the intersection approach of queued vehicles and stopping all conflicting movements, traffic signal-related delay in moving through the intersection is avoided. In the assessment of existing or potential delays from signals, only three locations would be considered as candidates for signal pre-emption: Richmond Road between Ironbound Road and Bypass Road; Bypass Road between Palace Lane and Waller Mill Road; and Page Street at York Street. While bus traffic through all three locations could benefit from traffic signal pre-emption, the benefit would be marginal. For example, at the Richmond Road/Ironbound Road intersection, signal pre-emption would reduce the average eastbound through movement delay below the current 27.7 seconds. However, any delay reduction at the Bypass Road intersection from pre-emption could also be realized through system coordination and timing modifications. The same applies at the intersections of Bypass Road with Waller Mill Road and with Palace Lane. At the Page Street intersection with York Street, traffic signal pre-emption would assist buses approaching from one direction, but only at the expense of vehicles (including shuttle buses) approaching from other directions. The system could not favor both westbound Page Street vehicles and westbound York Street vehicles simultaneously.

Second, dedicated bus lanes and stops are most effective where there are no access conflicts. When using the dedicated lane, bus operators should not be concerned with crossing vehicle movements. By design, the shuttle bus routes are intended to provide local service to hotels in the Williamsburg area. Each route will have from 10 to 12 stops and, with one exception, will move through a heavily developed area. Along both the Richmond Road and Bypass Road segments of the U.S. 60 corridor, development access driveways are relatively frequent. Restricting the curb lane for express bus service would create motorist confusion in resolving conflicting movements. An express bus lane could easily be set up along westbound Pocahontas Trail, because the roadway is adjacent to the

mainline CSX railroad. However, the planned U.S. 60 South Bus Route runs along east-bound Pocahontas Trail, and adjacent properties do have access established on this side of the roadway.

Finally, neither pre-emption nor express bus lanes appear to be needed because, with the exception of the deficient area discussed previously, most of the U.S. 60 corridor will function adequately with existing pavement markings and traffic signal system protocols. The existing p.m. peak-hour average travel times indicate shuttle buses will operate at efficient speeds along the corridor.

Turn-Lane Modification

With shuttle buses expected to travel mainly along the outside lane – or curb lane – the potential for modification of lane assignments at intersections is limited. The only location where this option is available is the intersection of Page Street and York Street. However, the balance of turning vehicles approaching the intersection would not be more efficiently accommodated by a re-orientation of turn-lane assignments.

Traffic Signal Timing and Phasing Adjustments

Adjusting traffic signal timing and phasing plans is a routine method for ensuring traffic signals are sensitive to vehicle flows. For example, in many municipal jurisdictions, traffic signals are evaluated in the field to adjust controller settings to address the approaching volumes to an intersection. Traffic volumes can change over time, and one set of signal timings will not optimally control traffic permanently. There are two areas where adjusting traffic signal timing will ensure that potential delays to shuttle bus operations are minimized. On Richmond Road between Ironbound Road and Bypass Road, traffic signal coordination between the two signals should be evaluated. At the Ironbound Road intersection, enhancing the “green time” for through vehicles on Richmond Road would reduce delay for shuttle buses (see Manual Traffic Control). When combined with effective adjustments to the phased offset timings in coordination with the Bypass Road intersection, eastbound shuttle buses should have an enhanced opportunity to move thorough the area only having to stop for the Ironbound Road signal. The same measures should be applied to the Bypass Road intersections with Waller Mill Road and Palace Lane. Here also, traffic signal timing and offset adjustments should enable buses to move through the system with the potential for stopping at one signal only.

It should be noted that these adjustments will be put in place only for the events requiring the implementation of shuttle bus services. Favoring one movement through an intersection will result in increased delays and longer vehicle queues for motorists approaching from other directions. These conditions should be considered temporary, with normal operation resuming upon completion of the commemorative event.

Manual Traffic Control

Manual traffic control is an effective method for using an existing traffic signal or a police officer to guide traffic under conditions where traffic flows are substantially different from those normally experienced. For example, police officers may manipulate a traffic signal controller at an intersection entrance to a parking lot for an athletic stadium. After the event, the officer will manage the allocation of “green time” to enable the parking lot to empty as quickly as possible. However, when the vehicle queues on the adjacent arterial street become excessively long, the traffic exiting the parking lot can be stopped while the arterial traffic is allowed to clear the intersection.

For the Jamestown 2007 major events, manual traffic control may be appropriate at three locations. First, at Richmond Road and Ironbound Road, manual control of the signal controller will enhance the potential for eastbound Richmond Road through vehicles (including the shuttle buses) to clear the intersection without extended vehicle queues. On the eastbound approach, the heavy right-turn movement to Ironbound Road is served by a short right-turn lane, and the vehicle queue frequently extends to block one of the two eastbound through lanes. To avoid this situation, the controller can be managed to ensure that the right-turn lane storage is cleared of vehicles. In combination with the modification to the coordination with the phasing offset at the downstream Bypass Road intersection, manual control will minimize shuttle bus delay moving through these two traffic signals.

A second location for manual traffic control is the intersection of Bypass Road and SR 132. This intersection exhibits marginal service levels and, under normal conditions, functions within adequate ranges. With the anticipated change in both the volume of vehicles and their directional splits, this intersection has the potential to become a bottleneck for all movements, including the Bypass Road Bus Route. Manual control during the period before and after major events will provide for more responsive operation.

The third location for manual traffic control includes the intersections of Page Street with York Street and with Second Street. As previously discussed, the vehicle queues along the westbound Page Street approach often extend over the CSX railroad bridge. Under special event traffic conditions, this queue will have the potential to extend into the operation of the Second Street intersection, blocking the ability of the Bypass Road shuttle bus to complete the left turn from Second Street to westbound Page Street. Manual control will reduce the length of the vehicle queue at York Street and will ensure that buses complete the left turn from Second Street without undue delay.

Manual traffic control also includes direction of traffic at unsignalized intersections, and one location is a candidate for this measure. To access westbound SR 199 from westbound Pocahontas Trail, shuttle buses must execute a left turn at the unsignalized intersection. With heavy traffic from the Jamestown 2007 event, buses may be confronted with a steady stream of traffic moving in the opposing eastbound direction. A police officer on site will be able to provide the necessary gaps in the eastbound traffic stream so that buses can safely complete the left turn to SR 199.

5.0 Case Studies

5.0 Case Studies

■ 5.1 Introduction

This section summarizes the four case studies developed to provide insight into various approaches taken to provide transportation services at major special events. All four case studies have occurred or will occur within the Commonwealth of Virginia. Given the variation in jurisdictional boundaries, policing authority, and financing among states, a reliance on examples within Virginia should be most relevant for the Jamestown 2007 planning efforts. The case studies selected consist of the following:

- Bedford D-Day Memorial Dedication Ceremonies (D-Day Memorial);
- Virginia Polytechnical Institute – Home Football Games (VPI Football);
- Richmond International Raceway (RIR); and
- Virginia Museum of Fine Arts – Egyptian Art Exhibit (Virginia MFA).

The selected case studies vary in magnitude, location, and duration. Given the uncertainty of the schedule and size of events for Jamestown 2007, this variation provides a range of useful experience from which to draw upon regardless of the ultimate configuration of the Jamestown 2007 events. Attendance ranges from several thousand at the Virginia MFA to more than 100,000 at the RIR, and the events also show substantial variation in visitor arrival and departure patterns. In the case of the Virginia MFA, attendance is spread throughout the day with both arrivals and departures occurring simultaneously. For the remaining three events, arrivals and departures are concentrated and highly directional. Table 5.1 provides some general information of the four case studies.

All of the case studies show the critical role transportation plays in the success of the event. In all cases, advance logistics planning ensured that attendees would be able to reach the venue with a minimum of frustration. This advance planning often involved the participation of multiple agencies and an organized committee structure. While there is no single formula for success that emerges from these case studies, there is a clear and consistent set of advance and event-time activities that are more likely than not to be as useful for Jamestown 2007 as they were for the events described here. Findings from the case studies are summarized in the sections below.

Table 5.1 Special Events Case Studies

Event	Estimated Attendance	Location (Urban/ Small Urban/ Rural)	Peaking Characteristics	Length of Event
Bedford D-Day Memorial Dedication Ceremonies	21,000 (7,000 turned away)	Rural	Heavy Peak, One Direction	< 1 Day
Virginia Polytechnical Institute – Home Football Games	55,000	Small Urban	Heavy Peak, One Direction	1 Day
Richmond International Raceway	105,000 to 110,000	Urban	Heavy Peak, One Direction	1 Day
Virginia Museum of Fine Arts – Egyptian Art Exhibit	Up to 3,500	Urban	Small Peak, Bi-Directional	3 Months

Traffic

- Reversible lanes, signal timing adjustments, and other traffic control measures are common, particularly for events with a heavy peak and one-directional traffic (VPI Football, RIR).
- Traffic control, when needed, is provided by local and, in some cases, state police (D-Day Memorial, VPI Football, RIR).

Parking and Shuttle Services

- On-site parking is often restricted or prohibited because of capacity constraints and/or security concerns (D-Day Memorial, Virginia MFA).
- Off-site parking and shuttle buses are offered as an alternative when on-site parking is restricted; off-site parking is consistently located within several miles of the site (D-Day Memorial, Virginia MFA).
- Open fields, shopping centers, sports stadiums, and amusement parks are used for off-site parking facilities (D-Day Memorial, Virginia MFA).

- Shuttle bus services are provided using school buses, charter buses, trams, and, in some cases, local transit buses (VPI Football for mobility impaired, D-Day Memorial, RIR, Virginia MFA).
- In some cases, attendees are required to walk up to 1.5 miles from “on-site” parking to the venue (VPI Football, RIR).

Ticketing and Event Schedules

- Ticketing is used for most events (VPI Football, RIR, Virginia MFA).
- In several cases, the issuance of timed tickets provides a means to spread arrivals and reduce peak demand for transportation services (Virginia MFA, potentially for AWF).
- Pre-event ticket sales provide information on attendees and can assist in identifying major travel routes, signage needs, and off-site parking provisions (RIR).
- Events scheduled later in the day help to stagger arrival times (VPI Football, RIR).

Alternative Transportation

- Private charter bus services for attendees traveling longer distances can reduce automobile traffic and parking demands (D-Day Memorial).
- Existing local transit services play a limited role in providing transportation to most events.

Signage and Information

- The Virginia Department of Transportation (VDOT) provides critical support with variable message signs, traffic monitoring, and, in some cases, real-time adjustments to local traffic signals (D-Day Memorial, VPI Football, RIR).
- Transportation information is typically provided with event tickets and in some cases over the Internet, on local traffic radio stations, and by the media (D-Day Memorial, VPI Football, RIR, Virginia MFA).

Financing

- Financial support is provided by most event organizers.
- Public support typically consists of traffic operations, security, and other personnel.

Safety

- Security levels are highly dependent on the attendees and potential risk.
- Increased security has included limitations on bags, random searches, vehicle searches, and plans for mass evacuations.
- High levels of security may result in entry delays and require earlier arrival times for attendees.

In addition to the conclusions reached with regards to specific issues, some of the event organizers have recommended or suggested some specific approaches based on some problems they have experienced. Some of the recommendations or “lessons learned” include:

- Events without tickets create uncertainty in attendance levels and make logistics planning difficult for both the event and supporting transportation services;
- Providing advance information on transportation to attendees through mailings or the local media will help avert confusion and improve operations;
- Clear lines of communication and authority should be established among traffic and parking personnel to allow for quick changes should unexpected circumstances arise;
- The cost of transportation services can be significant on a per person basis, particularly for smaller events; and
- Advance planning is critical.

A detailed summary of the four case studies follows this introduction and summary. For each of these summaries, a brief description of the event is provided with detail on the transportation plan, the organizational structure for event planning, the financing arrangement for the transportation element, and the approach to disseminating information.

■ 5.2 Bedford D-Day Memorial Dedication Ceremonies and Presidential Visit

Background

The dedication ceremony for the newly constructed D-Day Memorial in Bedford, Virginia, was held on June 6, 2001. President George W. Bush spoke at the ceremonies. Admission was provided on a first-come, first-served basis and approximately 21,000 people attended. In addition, an estimated 7,000 people were turned away because of on-site capacity constraints.

President Bush's attendance required an increase in security and restrictions on the timetable for admission to the event. Organizers were required to close the site approximately 90 minutes prior to the president's arrival. However, the large number of attendees and capacity limits at the site forced the event organizers to close the gates at 9:15 a.m., about an hour earlier than originally planned. Organizers suggested that they would consider using a ticketing system for future events of this size given some of the problems encountered with the larger-than-expected crowd.

Transportation Plan

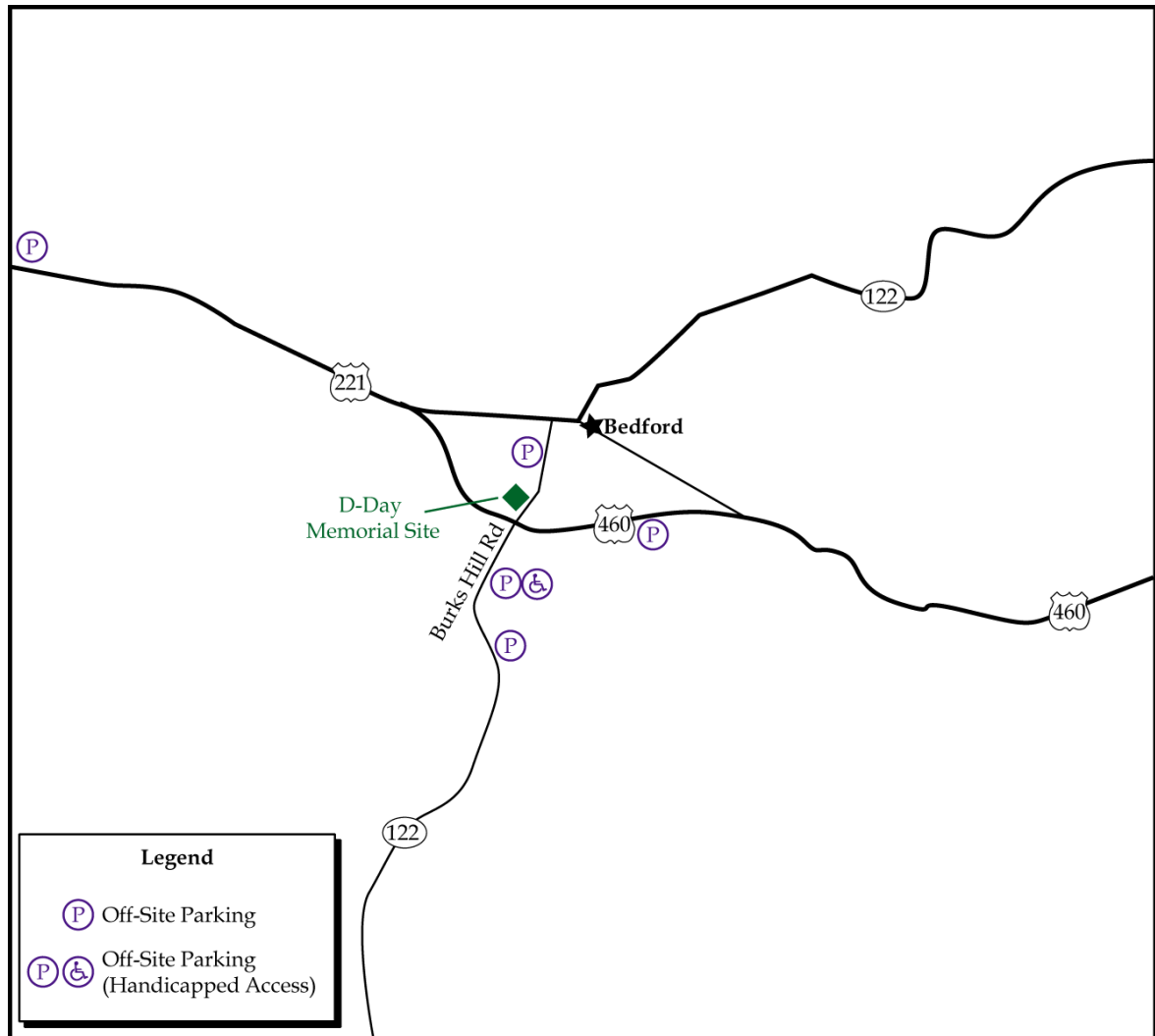
Site restrictions, security, and limited parking required a sophisticated plan for the dedication ceremonies. The plan included the provision of off-site parking, shuttle services, and outreach to provide attendees with information on how to travel to the site.

Traffic and Parking

The D-Day Memorial is located adjacent to the U.S. 460 Bypass. The site has only a single point of entry, provided by a two-lane roadway. The memorial site is approximately nine acres. Parking is provided around the site along a one-way roadway that surrounds the site. Figure 5.1 shows the layout of the site.

On the day of the dedication ceremony, all automobile traffic was restricted from the site and attendees were required to arrive by shuttle bus. Transportation to and from off-site parking was provided by a fleet of 60 school buses, 10 of which were accessible for the mobility impaired. Buses began service just before 7:00 a.m. and continued until the site reached capacity just after 9:00 a.m. Placards with different colors were placed in the front of buses indicating the location of the off-site parking served. Most of the off-site parking lots were established in open fields and all were located within four miles of the site (see Figure 5.2). A small number of attendees arrived on foot. However, they were also required to board a shuttle bus for the final approach to the memorial.

Figure 5.1 Bedford D-Day Memorial Dedication Ceremonies
Site Location and Special Event Parking



At the close of the event, the colored placards were used to direct passengers to buses based on the location of the off-site parking lot served by each bus. However, long lines and frustrated passengers led the bus drivers to remove placards and agree to stop at every parking lot. This led to some delays and confusion after the event. Despite some of these unexpected delays, the site was cleared within two hours.

Figure 5.2 Bedford D-Day Memorial Dedication Ceremonies
Off-Site Parking Facilities



Charter Services

Charter buses played a significant role in providing access to and from the event. Several charter bus companies provided tour packages for the day that included transportation to and from the site. Charter buses were allowed to enter the site to drop off and, later, pick up passengers. As shown in Figure 5.3, parking for charter buses was provided at a local Wal-Mart that was under construction and had not yet opened. Approximately 120 charter buses came to the event, with an average of 40 to 50 people per bus. A week prior to the event, the police department contacted two national charter bus associations to attempt to determine the number of buses planning to provide service to the dedication ceremonies. However, this information was not readily available and the police department was unable to obtain an estimate of the number of charter buses arriving.

Figure 5.3 Bedford D-Day Memorial Dedication Ceremonies
Off-Site Parking for Charter Services



Security

Security for the event was driven by the presidential visit. The event coordinators were required to fence the entire site and restrict access. After being dropped off by the shuttle buses, all attendees were required to pass through metal detectors. Each attendee was allowed to bring only a small carryon into the event. The event planners coordinated their activities with the Secret Service to ensure that adequate security would be provided. Early in the morning on the day of the event, the site was closed for several hours and secured by the Secret Service.

Organization

Planning for the dedication ceremony was conducted by four committees, one of which was dedicated to the transportation element. Although the committees provided input on event planning, a representative of the D-Day Memorial Foundation and a member of the Bedford Police Department conducted the day-to-day logistics and coordination. The police department representative was assigned to this event almost exclusively for 18 months prior to the ceremonies. The committees met once a week in the months preceding the event and included representatives of the police department, the D-Day Memorial Foundation, and the VDOT.

Funding

Most of the services related to the dedication ceremony were provided at little or no cost to the foundation. Buses were borrowed from the local school system and the foundation was required to pay only for the labor of the drivers. The local police department provided security and traffic personnel at no cost to the foundation. In addition, no direct reimbursements were provided to the owners of the sites used for parking. Owners were provided with a receipt for an in-kind donation to provide a means for a tax deduction.

Communication

Information on transportation for the dedication ceremonies was provided on local radio stations. In addition, VDOT's radio station, 1610 AM, was used on the day of the event to provide information to the public. VDOT also provided information to drivers using variable message signs along U.S. 460.

■ 5.3 Virginia Polytechnical Institute – Home Football Games

Background

Virginia Polytechnical Institute (VPI) is home to one of the most popular college football programs in the Commonwealth of Virginia. Typically, home football games attract crowds that approach or equal Lane Stadium's capacity of 55,000. The VPI Department of Transportation estimates 15,000 automobiles and 25 to 40 buses will travel into Blacksburg on game days. On average, the automobile occupancy is estimated at more than three persons per vehicle.

Attendance is drawn from students, alumni, and others. The result is a mix of both local and long-distance travelers. About 7,000 tickets are reserved for students, with the remainder distributed among season ticket holders and spectators for the opposing team.

A significant number of attendees travel from Northern Virginia, Richmond, and the Tidewater area of Virginia. In many cases, those traveling longer distances arrive the night prior to a game and stay at local hotels, particularly for games scheduled to begin at noon.

Transportation Plan

VPI and supporting agencies have developed a relatively sophisticated program to manage large events on campus. A transportation plan has been developed and is updated annually by a three-person committee consisting of the Deputy Chief of Police for Blacksburg, the Associate Director of the VPI Athletic Department, and the head of the Transportation Department at VPI. Prior to the start of each football season, this group meets to develop a final transportation plan for the upcoming season's home football games. The plan consists of traffic operations, parking management, and public transit elements.

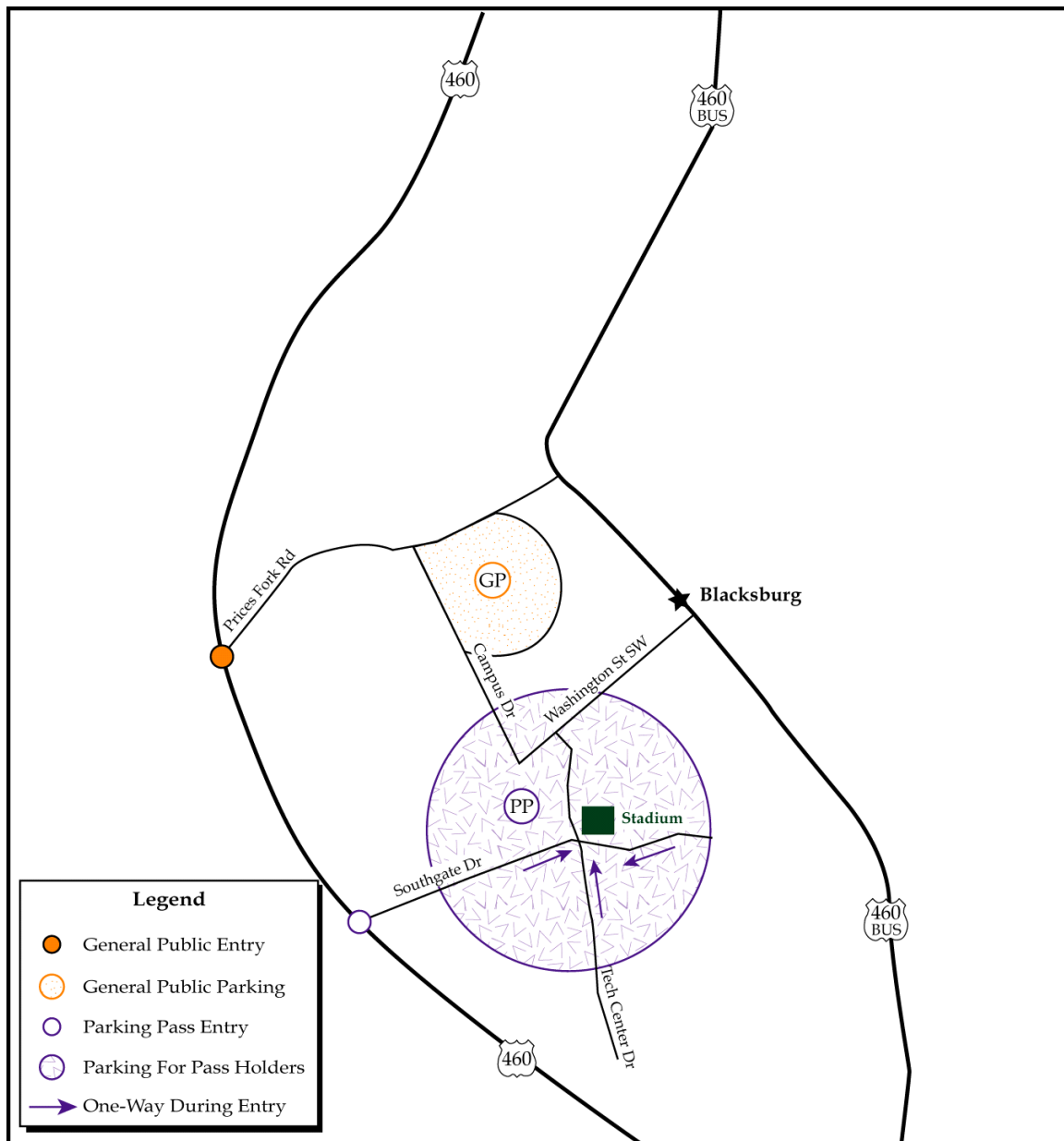
Traffic Plan

The magnitude of traffic on game days presents a challenge to Blacksburg, a city of just 40,000 with a relatively limited transportation network. Most traffic headed to the football stadium is required to use the U.S. 460 Bypass, which is two lanes in each direction and provides the primary connection between the campus and I-81. Two, four-lane arterials (Prices Fork and Southgate) connect the U.S. 460 Bypass to campus parking lots. Figure 5.4 provides a map of the location and indicates some of the traffic operations in place prior to the event.

VDOT provides assistance with local traffic operations. VDOT uses helicopters to monitor traffic along the U.S. 460 Bypass and on the two major arterials connecting the U.S. 460 Bypass to campus. Based on congestion levels, traffic signals are modified to provide additional green time to major approaches. During special events, the green time on some signals will extend up to 10 minutes. This does have an adverse effect on intersecting roadways, but local residents are aware of these operations.

The police department is responsible for traffic control in the immediate vicinity of the stadium. Officers are stationed at intersections within approximately one mile of the stadium. Typically, two police officers are stationed at each location. This allows one of the officers to talk or provide directions while the other can maintain control of the intersection. An estimated 60 to 70 officers work a single event. Three hours prior to each event, several of the major roadways that provide access to campus parking facilities are restricted to one-way operation to increase roadway capacity into campus. These lanes are reversed after the event and again restricted to one-way traffic.

Figure 5.4 Virginia Polytechnological Institute - Home Football Games
Pre-Game Parking and Traffic Operations



Parking

Parking is provided on both a permit and fee basis. In total, the athletic department controls about 8,000 spaces. Of this total, 6,000 are distributed to contributors using a permit system. The remaining 2,000 are available to the public at \$5.00 per vehicle. All of the parking is located within 1.5 miles of the stadium. In addition to spaces controlled by the athletic department, other spaces are available in the adjacent neighborhoods and in area

shopping centers. Residents often sell spaces in their driveways or front lawns. VPI also reserves 4,000 spaces on game days for faculty and staff. The intent is to provide parking for students and faculty working on campus, but many spaces are used by those attending the game. Parking services is unable to enforce this restriction.

Season ticket holders with parking permits are directed to lots in the vicinity of the stadium. Permits are lot specific and for some, spaces are assigned. All permit holders are directed to enter campus from U.S. 460 using Southgate, which provides access to the southern part of campus and the stadium. The general public is directed to use the Prices Fork entrance, which provides entry into the northern part of campus where most of the remote parking is located. The separation of traffic also assists in traffic operations.

Transit

Transit plays a somewhat limited role in special events operations. Although no event-specific service is provided, the local transit system adds service to its existing routes to accommodate increased demand. In previous seasons, the local transit system provided service between the public parking lots and the stadium. The athletic department no longer funds this general service. It is now limited to the mobility impaired.

Security

VPI has increased security in the wake of the 2001 terrorist attacks, although these changes have not affected the transportation system. Attendees are now encouraged to leave all bags at home. Although these items are not explicitly restricted from the stadium, VPI now requires a thorough search of all bags. As a result, those who choose to carry bags into the stadium face an additional delay.

Organization

The Blacksburg Police Department takes the lead on game-day operations. Prior to each season, the local police department meets with cooperating police departments from local and neighboring jurisdictions. Ten to 15 neighboring departments provide staff support for special events. Responsibilities for each of these supporting departments are established prior to each season. As discussed earlier, VDOT provides assistance in monitoring traffic and adjusting signals as needed.

Parking services within the VPI Transportation Department is responsible for managing on-campus parking facilities. The athletic department contracts with parking services to provide this service. Parking services staffs each event with approximately 20 full-time staff and 60 to 70 students.

Funding

Funding for special events is provided entirely by the athletic department. The athletic department provides payments to all participating law enforcement agencies to cover the cost of operations. Parking services is also reimbursed for the services and staff support it provides. The athletic department collects all revenue from the public parking spaces to cover some of this cost.

Communications

Information on game-day operations is provided to attendees and local residents through several media. Season ticket holders receive detailed information on directions and parking with their tickets. VPI faculty, students, and staff receive an e-mail each year that details event-related parking and traffic information. This e-mail is one of a limited number sent systemwide during the year. Given the regularity of events and the large number of regular season ticket holders in attendance, providing information is not a critical component. Many attendees park in the same location year after year and are aware of the general special events operations.

■ **5.4 Richmond International Raceway**

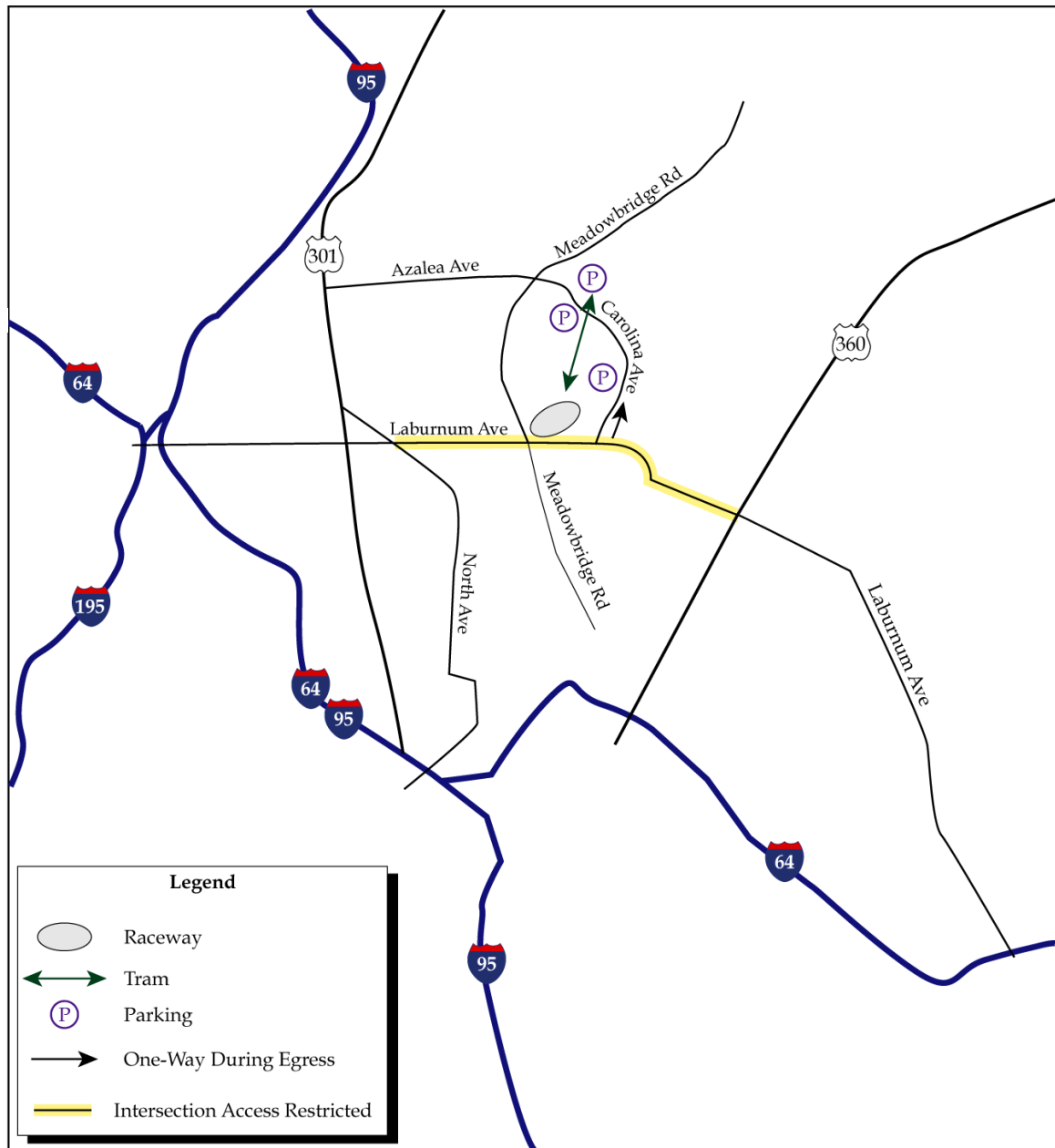
Background

Richmond International Raceway (RIR) has hosted auto races since the 1940s, when it opened as a one-half mile dirt track. RIR has hosted NASCAR Winston Cup Series races since 1953. Located in the northeast part of the Richmond metropolitan area at the Henrico County/City of Richmond line, RIR is close to a number of major arterial highway interchanges with I-64, I-95, and I-295 (see Figure 5.5). Originally a half-mile oval track, it was redesigned in 1968 to its current length of three-quarters of a mile.

Permanent grandstand seating accommodates 94,030 spectators. An additional 1,890 luxury, VIP seats are provided in 34 skybox suites. Total seating capacity is thus 95,920 persons. Total on-site attendance for a typical race, including spectators in the grandstands and track infield area, drivers and support crews, vendors and other event staff, is generally on the order of 105,000 to 110,000 persons. Over the course of a typical three-day event, including qualifications and several day and night races, it is estimated that many more than 200,000 persons visit the site.

The track itself, the infield, and the grandstands comprise an area of approximately 50 acres. An additional 600 acres is used for on-site parking and track-support functions.

Figure 5.5 Richmond International Raceway
Post-Race Traffic Operations



Based on anecdotal information provided by RIR officials, the majority of spectators come from Virginia and surrounding states. During major race weekends, it is not uncommon to have full occupancy at all hotels in the region from as far south as Petersburg and Williamsburg to as far north as Fredericksburg. The majority of spectators arrives on Thursday or Friday and returns home on Sunday following the main race on Saturday night. Approximately 4,000 recreational vehicles/motor homes remain on site during an average race weekend.

While a mixture of day and night races is offered throughout the year, the highest attendance events are the night races. The first night races were offered in 1992 and have proven to be extremely popular with both race crews and spectators. The following factors were cited by RIR staff as having encouraged night racing:

- Easier access by spectators because arrivals can be dispersed throughout the day and departures take place during hours of very low background traffic.
- Cooler temperatures during spring and summer months for drivers, pit crews, and spectators.
- Drivers generally get Sundays off (the typical race day).
- Rain delays on Saturday nights still allow for the races to be run on Sundays. This minimizes potential problems with temporary personnel who would have a conflict working on a Monday for a rain-delayed Sunday afternoon race.

Transportation Plan

Over the years, representatives of RIR, VDOT, the city of Richmond, and Henrico County have developed a well-organized traffic access, circulation, and parking plan to minimize congestion for arriving and departing patrons. An event guide with information on the site access and parking plan is updated annually and provided to all ticket buyers, news media, and event staff. The guide provides information on pre-event and post-event traffic circulation patterns on the adjacent street system, on-site and satellite parking, and shuttle bus services connecting the parking areas and the track itself.

Traffic Access and Circulation Plan

Vehicular access is not viewed by RIR staff as a major issue. There is adequate roadway access on approaches to the venue, including several multilane divided arterial streets with direct access to the regional interstate highway system. On race day, the gates to the on-site parking areas open at 6:00 a.m. Autos and recreational vehicles typically arrive throughout the day until 8:00 p.m. when the evening races start. On those occasions when day races take place, arrivals take place between 6:00 a.m. and 12:00 p.m. Reversible lane operations and intersection turn prohibitions are provided along Laburnum Avenue and Azelea Avenue both prior to and following the races.

Local traffic operations are the responsibility of the city of Richmond and Henrico County police and traffic engineering staff. Signal timing along the arterial approach routes is optimized to facilitate entry and exit to the facility. All adjacent intersections are controlled by local police prior to, during, and following each race. Raceway staff report that all spectators who wish to leave following the end of a race are out of the parking areas and on the road within two hours and 48 minutes after the end of a race. It was noted that large numbers of spectators remain with their vehicles and tailgate for several hours after the conclusion of a race.

Parking

Parking is provided both on site and at several off-site satellite locations. Approximately 48,000 paved on-site parking spaces are provided. An additional 12,500 off-site parking spaces are provided at two locations: the Richmond Coliseum in downtown Richmond and the Meadowbridge Flea Market. The on-site parking areas open at 6:00 a.m. daily and parking is free. Tram service is provided from the more remote on-site parking areas to the grandstands beginning at 9:00 a.m. and continuing until the beginning of the race. Beginning 45 minutes after the checkered flag drops, the trams begin transporting people back to the parking annex area and run for approximately two hours.

Parking at the off-site satellite lots is \$5.00 per vehicle per day, with a free shuttle bus service to and from RIR. Travel time between the downtown Richmond off-site locations and the grandstands is approximately 15 minutes each way. The off-site shuttle service begins at 2:00 p.m. and continues until the beginning of the race. Operations back to the satellite lots begin 45 minutes after the completion of the race and continue for approximately three hours. The downtown shuttle bus service is planned to expand in 2002 to connect RIR with a new 1,200-car parking deck now under construction.

All shuttle bus and tram vehicles are “flagged” with colors indicating which parking area (Green, Yellow, etc.) the vehicle serves.

Information provided by RIR officials indicates that the average vehicle occupancy is approximately 3.2 persons. It was reported that the on-site parking facilities have never reached 100 percent occupancy since the most recent expansion program in 1988.

Transit

Transit access to the site has been playing a larger role in recent years. It is estimated by track staff that approximately 300 tour buses transport spectators to RIR on a typical race day. The estimated average occupancy of each bus is approximately 50 persons. Thus, approximately 15,000 of the total seated capacity of 95,920 persons (or about 15.6 percent) arrive by transit.

While bus arrivals are dispersed throughout the day, the departure pattern is much more concentrated. Typically, all 300 +/- buses will load their passengers and leave within no more than one hour of the end of the race. On several occasions, a few passengers have been left by their buses.

RIR staff also indicated that the potential for expanded shuttle bus operations to connect area hotels directly with the track is being investigated.

Security

Security is maintained on the premises by local and county police. Additionally, the 2003 Fan Guide contains relevant rules and regulations for both grandstand and campground spectators, including the types, dimensions, and contents of items that may be brought into the Raceway. The Guide specifies that spectators may bring one soft-side insulated cooler that holds ice, drinks, or food, as well as one clear plastic bag and separately worn items such as binoculars, headsets, or cameras. Seat cushion bags will be subject to review on an individual basis, and all items brought through the gate are subject to inspection.

Organization

The city of Richmond and Henrico County Police Departments are responsible for race-day traffic operations. City and county traffic engineering personnel are responsible for the installation and removal of static traffic directional signing, traffic cones, etc., on the adjacent arterial street system. City and county traffic engineering staff also adjust traffic signal timings as necessary to minimize congestion. Additional traveler information is provided on the interstate highway variable message sign system maintained by VDOT.

Funding

The funding of the traffic and parking systems is provided entirely by the revenues generated by ticket sales and concessions at Richmond International Raceway. RIR proves reimbursement to the local police departments and traffic engineering agencies to cover their cost of operations.

Communications

As noted earlier, all persons purchasing tickets receive an event guide with detailed information on traffic access, circulation, and parking. Additional information is provided in the form of static and variable message signs along the arterial routes connecting RIR with the interstate highway system.

■ 5.5 Virginia Museum of Fine Arts – Egyptian Art Exhibit

Background

The Virginia Museum of Fine Arts (Virginia MFA) is located in a residential neighborhood just outside of downtown Richmond, Virginia. Monthly attendance ranges from just more than 13,000 to more than 80,000 during special events, but more typically is in the range of 20,000 to 35,000. Attendance varies widely on a daily basis, but is generally in the range of 1,000 to 1,500. The museum is open Tuesday through Sunday from 11:00 a.m. to 5:00 p.m. On Thursdays, it remains open until 8:00 p.m.

The museum location, in a predominately residential section of Richmond, Virginia, presents some challenges during special events. The museum has only 120 parking spaces, with some additional parking on adjacent streets. During special events, several thousand people often attend, a number that cannot be accommodated by the adjacent parking facilities. The Egyptian Art Exhibit, held in the fall of 1999, drew an audience larger than is typical for the museum. During the month of November 1999, the museum drew more than 80,000 visitors.

Transportation Plan

Typically, the museum is able to accommodate visitors in the adjacent parking facilities. In the case of the Egyptian Art Exhibit, visitors were required to park in an off-site location. Off-site parking was provided at the Richmond Baseball Diamond, located just off of I-64 and I-95, just more than a mile from the museum. Shuttles were provided to and from the museum. The parking location was easily accessible from the interstate and most of the visitors, particularly those traveling from out of town, were willing to take shuttle buses to the museum. The only complaints were from museum members accustomed to parking on site. Some visitors parked on the street in the vicinity of the museum.

Organization

Planning for the transportation element of special events is handled internally by museum staff. The museum contracts for shuttle and parking services directly.

Figure 5.6 Virginia Museum of Fine Arts



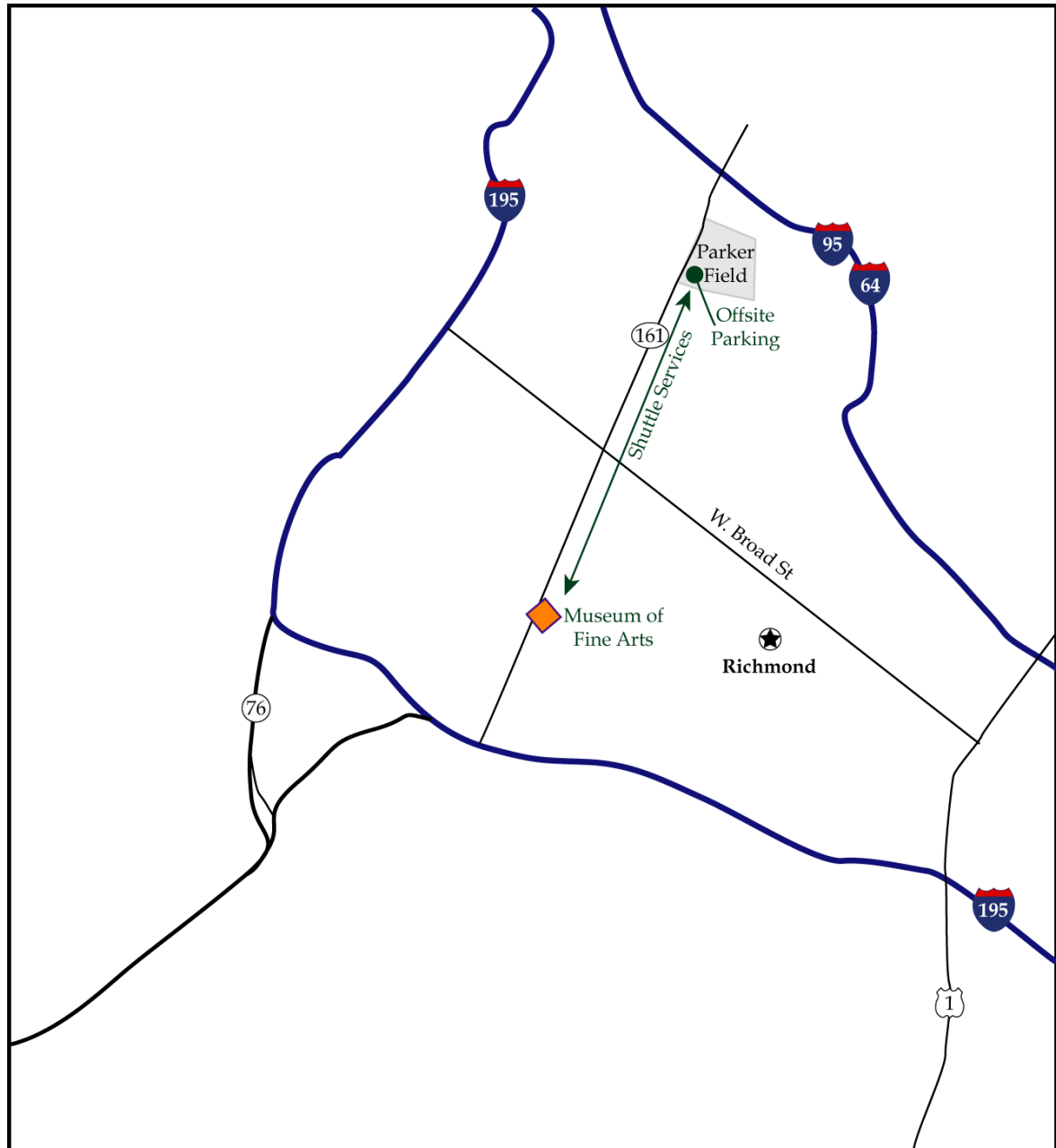
Funding

The museum covers the cost of all transportation services. Although the museum staff was unable to provide specific figures on the cost of these services, it was considered significant. For more recent special events, the museum has provided off-site parking and shuttle services only on the weekend to reduce these costs.

Communication

Tickets were distributed prior to the event with a specified arrival time. Staggered arrival times were used to disperse visitors in the museum throughout the day. Information on parking was provided with the tickets.

Figure 5.7 Virginia Museum of Fine Arts - Egyptian Art Exhibit
Parking and Shuttle Services



6.0 Traveler and Regional Visitor Information Systems

6.0 Traveler and Regional Visitor Information Systems

■ 6.1 Introduction

The purpose of this project memorandum is to present an initial assessment of traveler and regional visitor information systems as they relate to Jamestown 2007. This information should be viewed as only an overview of current conditions as they existed in early 2003, and will be updated and expanded upon as additional information is obtained.

The provision of accurate and timely information is a critical element in ensuring the success of any large-scale public event such as the commemorative activities associated with Jamestown 2007. This information is of use and importance to a wide range of users, including not only actual visitors to the event, but also event organizers and sponsors, local residents and businesses, transportation agencies, police and emergency personnel, and tourism information agencies. For the purposes of this initial discussion, the focus will be upon those items of primary interest to visitors to an event.

■ 6.2 Potential Visitor Information Needs

There are a number of information items for which event visitors have an interest. These include, but are not limited to, the following:

- A description of the attraction/event – Where will the event take place? On what day will it take place? At what time of the day and for how long? What is the cost?
- How can the attraction/event be accessed? What travel modes are available and how much time and cost are associated with the use of each? If driving to the event, where is parking allowed and how far is this site from the actual event? What will it cost to park at this location?
- What type of food and lodging options are available? Where are these visitor services located in relation to the desired attraction/event? What are the costs of these visitor services?
- What other related attractions exist in the area? What other shopping and/or entertainment opportunities exist in the area?

The challenge for any visitor or traveler information system is how best to provide this range of desired information across a broad spectrum of locations at a reasonable cost. At a minimum, this range of information needs to be available at the origin of the trip (typically at home), en route between the place of origin and the destination, in the vicinity of the event/attraction, and at the site of the event/attraction. During each segment of the trip, this information can be made available through a variety of print and electronic media. As illustrated on Table 6.1, the information can be provided through means as diverse as black-and-white printed brochures at one extreme and interactive computer terminals at the other.

Table 6.1 Potential Visitor Information Dissemination Process

Information Dissemination Method	Location of Information Dissemination			
	At Home	En Route	In Vicinity of Attraction	At Attraction
Internet Link	X	X	X	
Toll-free Telephone	X	X	X	
Television, Newspaper, or Magazine Ads	X	X	X	
Direct Mailings	X			
Static Highway Information Signs		X	X	X
Dynamic Highway Information Signs		X	X	X
Traveler Advisory Radio		X	X	X
Information Kiosks		X	X	X
Convention and Visitors Bureau Staff	X	X	X	
Attraction Staff	X	X	X	X

At the *home end* of a trip, the primary information sources include print media (newspapers, magazines, and targeted mailings), radio and television advertising, the use of toll-free telephone numbers, and the Internet.

While *en route* from home to an attraction/event venue, information is generally disseminated through the use of either static or dynamic highway information signs or highway advisory radio services. Static signs include those providing both general route and destination information, and information specific to a specific destination or event. Dynamic signing can take the form of either permanently emplaced variable message signing (VMS) installed as part of regional or statewide intelligent transportation systems (ITS) programs or portable VMS sign displays that can be quickly and easily moved from place

to place in response to specific requirements. An example of the latter is the use of portable VMS installations in connection with major roadway construction projects.

Additional en route information can also be provided in a variety of formats through dissemination at highway rest areas and visitor information centers. For example, the Commonwealth of Virginia is currently engaged in a program to upgrade and modernize several of the major visitor information centers located along the I-64 and I-95 corridors in anticipation of Jamestown 2007. To the degree allowed by available funding, one proposed upgrade would be the installation of interactive information kiosks at several of these locations.

As visitors find themselves in close *proximity* to their desired attractions/events, the challenge becomes one of providing information on a more real-time basis. Directions to appropriate parking areas (and the number of available spaces), the location and availability of shuttle bus services, information on lodging and other guest services, and associated data becomes more critical at this stage of the trip. A greater reliance needs to be placed on information dissemination through the use of static and dynamic signing and travel advisory radio and related ITS elements.

Once *at the site* or attraction itself, visitors need to be directed to appropriate entrances and parking areas if arriving by private auto. For those visitors arriving by some form of public transit, information needs to be provided to the operators of the transit vehicles as to where they enter and park or discharge their passengers. Clear distinctions need to be made between various types of vehicular access points and parking areas (auto versus bus, general public versus event staff, etc.).

The use of live personnel represents a critical element of the visitor information system at the attraction itself. These include not only attraction employees, but also the staff of local transportation agencies and local police and emergency services. The types of “real-time” information provided by these personnel include direction to site entrances and parking areas, traffic control within parking areas, and the direction of visitors to pedestrian pathways and shuttle bus boarding areas.

■ 6.3 Current Local and Regional Plans to Enhance Visitor Information

In anticipation of the increased visitation levels that are anticipated to be associated with Jamestown 2007, a number of public and private initiatives are underway to provide improved visitor and traveler information. In addition to the use of traditional maps and information brochures, a rapidly growing source of visitor information in Virginia is the Internet.

As noted previously, the Virginia Department of Transportation (VDOT) is beginning a program to upgrade and modernize the facilities and services provided at a number of rest areas along the Commonwealth's interstate highway system. Improved visitor information services will be incorporated into these activities. These actions would be undertaken within the context of the statewide traveler information and ITS functions administered by VDOT.

VDOT's "SmarTraveler" program seeks to provide real-time information on traffic and weather conditions on the State's interstate and primary highway system (<http://virginiadot.org/comtravel/>). In addition to general statewide information, more detailed local commuter information is currently being provided in the Northern Virginia and Hampton Roads regions. A rather comprehensive tourism and traffic information service is provided by Travel Shenandoah.com. The Travel Shenandoah web site (<http://www.travelvirginia.org>) provides a single integrated source of information on travel conditions, food and lodging, shopping and services, tourism and attractions, and emergency services along the entire I-81 corridor in Virginia. One of the most useful features of Travel Shenandoah is its comprehensive series of links to other public and private attractions and services throughout the region. It is envisioned that the Travel Shenandoah concept will be expanded over time throughout the entire State.

In addition to traffic and weather information provided by VDOT, the Virginia Tourism Corporation (VTC) maintains a very comprehensive listing of travel-related information (<http://www.vatc.org>). The Virginia Tourism web site (<http://www.virginia.org>) is the official on-line tourism guide to the Commonwealth of Virginia. As in the case of the Travel Shenandoah web site, the Virginia Tourism site provides extensive linkages to a wide range of public and private information sources.

Within the greater Williamsburg-Jamestown-Yorktown area proper, all of the major attractions engage in a variety of visitor information dissemination activities. These range from extensive use of traditional print media and television advertisements to highway informational signing and continually improving web sites.

Based upon an initial review of a representative cross section of these materials, it appears that while each of the attractions does a very good job of providing information about itself to potential visitors, there is typically only limited information provided relative to complimentary activities. Thus, for example, the web site for the Jamestown-Yorktown Foundation (www.historyisfun.org) presents extensive information on the Jamestown Settlement and the Yorktown Victory Center, but does not provide a convenient linkage to the web site for Colonial National Historical Park (www.nps.gov/colo) and the information that the latter contains on Jamestown Island and Yorktown National Battlefield. Thus, one near-term objective for the provision of enhanced visitor information would be the creation of appropriate links between the various web sites maintained by each of the major attractions in the Historic Triangle region.

■ 6.4 Existing ITS

One of the primary missions of ITS is to bring accurate and reliable information about travel conditions and travel options to the traveling public. In the Hampton Roads Area, ITS is supported and promoted through public/private partnerships and close cross-jurisdictional coordination. Jamestown 2007 travelers will benefit from traveler information systems that are planned for expansion into the Historic Triangle area by 2007. This section describes the state of ITS for personal travel, including recreational travel, that currently exists, the state of initiatives programmed and underway, and those projects that are planned for implementation within five years.

There are various ITS initiatives for personal travel currently in service in the Hampton Roads area that are relevant to Jamestown 2007. They include:

- Smart Traffic Center (STC) of Hampton Roads, and the programs operated from it:
 - Hampton Roads Traffic Management System Phase I (TMS);
 - Roadway Information System (RIS);
 - Emergency Detection and Response System and Incident Management;
 - Highway Advisory Radio (HAR); and
 - James City County Transit Incident Management Communications Network.

The result of years of inter-jurisdictional planning is the “Hampton Roads ITS Strategic Plan” (May 2000), a document describing out goals and priorities for ITS implementation.

Smart Traffic Center

VDOT’s Smart Traffic Center (STC) of Hampton Roads is a vital component of COMPARE. It is the coordinating center for a number of regional ITS initiatives and employs five major traffic management strategies. They are:

- Traffic/Congestion Management;
- Incident Management;
- ITS;
- Emergency Operations; and
- Research and Development.

The Smart Traffic Center receives traffic data from 600 vehicle sensors and features a wall of 38 video monitors linked to cameras set up along 19 miles of the area’s most congested roads, Interstates 64 and 264 (TMS Phase I). Smart Traffic Center controllers monitor the camera images 24 hours a day and can respond to traffic slowdowns or accidents quickly by contacting a Freeway Incident Response Team (FIRT) and notifying the traveling

public of adverse traffic conditions via variable message signs and highway advisory radio announcements. The projected full deployment (TMS Phase III) will bring the total to more than 280 cameras, 240 variable message signs, and nearly 2,700 vehicle detection devices along 113 miles of Hampton Roads interstates.

Hampton Roads Traffic Management System Phase I (TMS)

The complete TMS implementation is scheduled to take place in three phases that increase the geographical scope of ITS instrumentation, thereby increasing the functionality of the STC. The first phase, currently in operation, includes 19 miles of coverage: I-64 from south of the Fort Monroe Tunnel (Hampton Roads Bridge Tunnel) to approximately the Chesapeake/Virginia Beach Line; I-264 from approximately Exit 13 to between Exits 18 and 19; and about two miles of the I-564 spur north from the intersection with I-64. The map below (Figure 6.1) shows the three phases of implementation and indicates that I-64 will be included as far north as approximately Exit 238, positively impacting access from the south to Williamsburg by 2007. The implementation schedule as originally planned was ambitious, with projected completion in 2003. It has subsequently been revised to a more realistic completion horizon of 2004 to 2005.

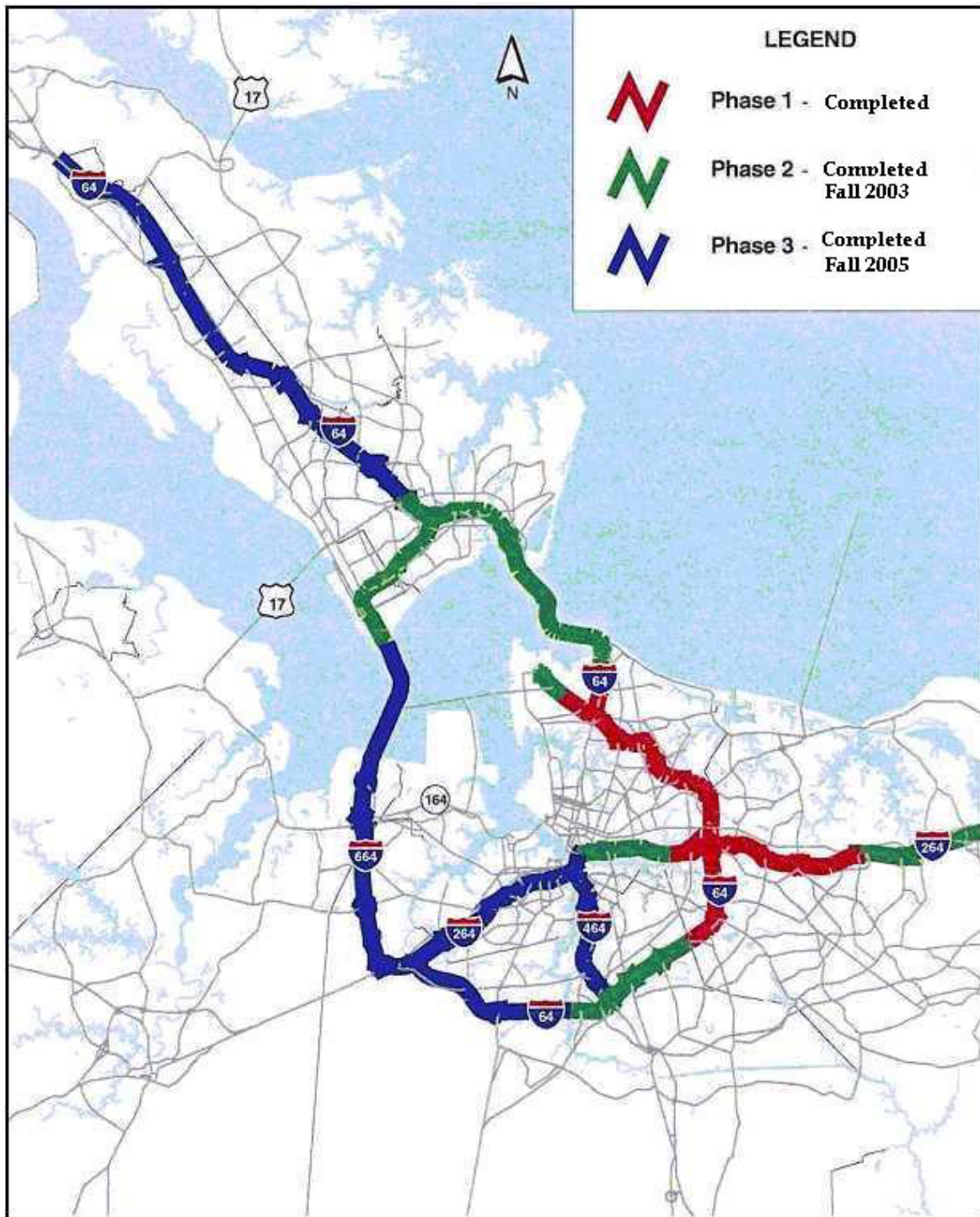
Emergency Detection and Response System and Incident Management

In Hampton Roads, 80 percent of incident detection is attributed to the FIRT, about seven percent to State Police Radio, and 13 percent to available ITS technology (cellular phone, Virginia Operational Information System (VOIS), and STC cameras). FIRT patrols the STC coverage area as well as areas slated for future coverage. FIRT coverage (without automated incident management deployment) is currently operational on the north side of I-64 up to Exit 247. Currently, James City County and Williamsburg are not in the coverage area. Future FIRT coverage with automated incident response is programmed to include I-64 as far north as the SR 199 interchange. This is programmed for implementation within the Phase III TMS implementation timeline.

Highway Advisory Radio

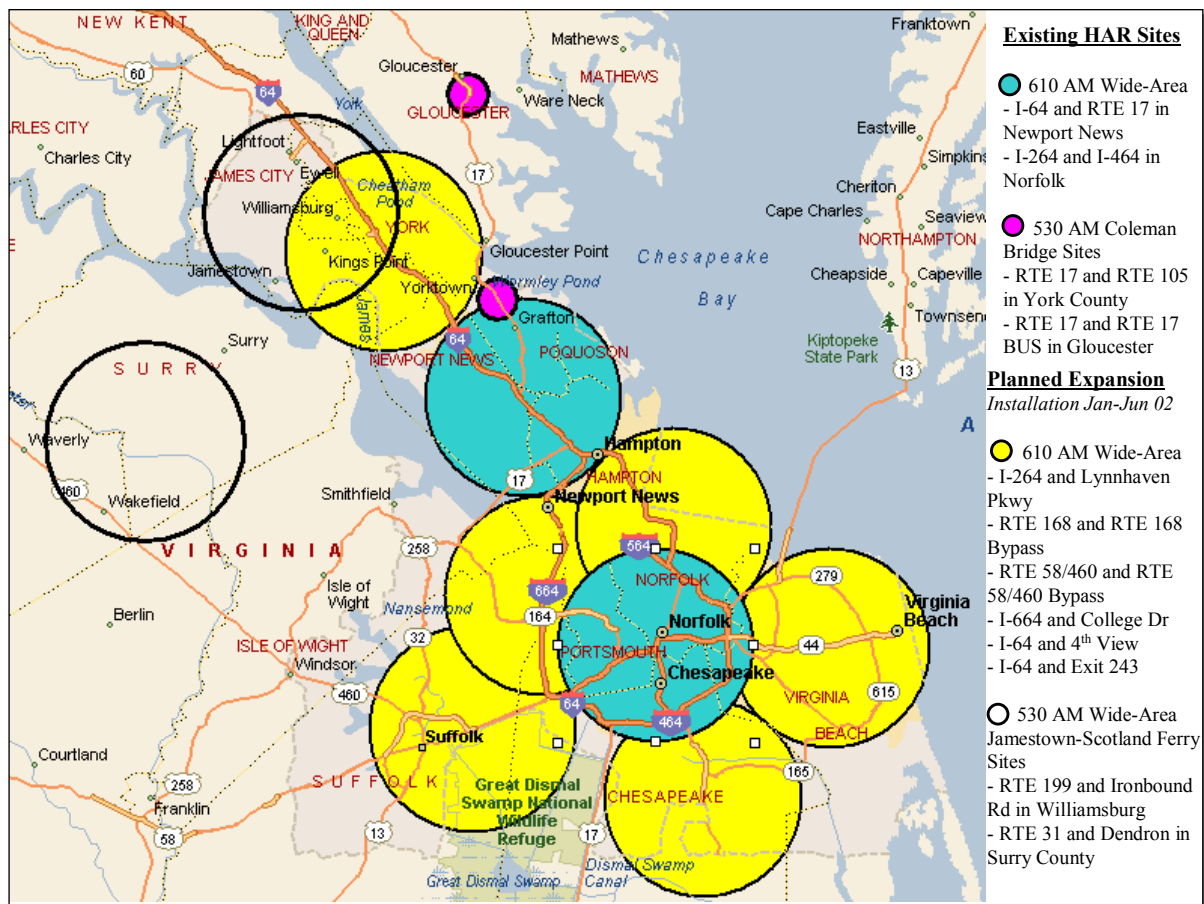
HAR is a traffic information dissemination system broadcasting on 610 AM. HAR has recently been upgraded to use a highly efficient antennae technology using two sites. This system replaced the old six individual transmitter sites previously used. By 2003, HAR sites covering I-64, from Lightfoot to Newport News, all major roadways in the lower peninsula including Suffolk, Portsmouth, Norfolk, Virginia Beach, and Chesapeake will be included in the HAR system (Figure 6.2).

Figure 6.1 Hampton Roads Smart Traffic Center
Existing and Proposed Coverage



Source: Incident Management Program for Hampton Roads Virginia 2001.

Figure 6.2 Highway Advisory Radio Sites



James City County Transit Incident Management Communications Network

The one ITS-related technology currently available for transit systems is the Incident Management Communications Network (IMCN). This project outfits public transit buses with cellular phones to be used in emergencies. It is currently fully operational.

■ 6.5 ITS Under Development and Planned

The near-term future of ITS in the Hampton Roads area looks just as bright and promising as the current implementation. The area ITS initiative is in keeping with the guidelines for the national ITS architecture. Below, we describe a number of partially operational, under development, and planned projects that will shape the ITS of the near future in Hampton Roads. All projects mentioned here are certainly expected to be in service in a timeframe that is useful and usable for Jamestown 2007.

The projects include:

- Hampton Roads Advanced Traveler Information System (HRATIS);
- Regional Multimodal Management System (RMMS); and
- TMS Phase II and III and Integration and Software Development.

Hampton Roads Advanced Traveler Information System

HRATIS is a concept for a private/public partnership between VDOT, HRPDC, U.S. Wireless, and Iteris, Inc. The HRATIS coverage area includes Hampton Roads, Franklin, Waverly, Wakefield, and Surry Counties and some areas of New Kent and Charles City Counties.

Its purpose is to disseminate traveler information, already being collected, by a wide variety of media including:

- Kiosks;
- Internet;
- Highway advisory telephones;
- Pagers;
- Personal digital assistants;
- Cable television; and
- Commercial vehicle networks.

The downturn in the economy and the demise of many internet-based business plans has affected HRATIS. A public-private partnership between VDOT and Iteris that was to have implemented HRATIS was terminated in early 2002. Although there are no plans to revive the partnership at this time, phone-based traveler information services (511) should be able to provide much of the same information provided by other media.

Roadway Information System

Originally conceived as an interim system until RMMS (see below) is implemented, the Roadway Information System (RIS) is a web-based data/information sharing program, covering freeway and arterial road and lane closures; construction, maintenance, and scheduled events; daily bridge opening schedules; and traffic incidents. The RIS is supported by input from 19 participating agencies, all of which have 24-hour-a-day access to input to the system. When inputs are received, reports are generated and distributed by various media (e-mail, page, phone, or fax) to a pre-designated distribution list for dissemination. RIS improves emergency responsiveness, traffic control, and planning.

RIS is an excellent system for event traffic management as event information can be stored once their dates, times, and locations are known. This information will then be shared with the public by the subscriber transportation agencies, state police, planning personnel, and others who can use the knowledge for traffic management, emergency response, etc. This will help in event coordination and traffic planning and also keep law enforcement personnel at an appropriate level of informed readiness.

Regional Multimodal Management System (RMMS)

This is an information processing and storage project, designed to be a clearinghouse of regional transportation data. It was programmed to be implemented by September 2001 but is not yet available and has questionable status at present.

One major component of the RMMS is the Roadway Information System (RIS). The RIS is a web-based data/information sharing program, covering freeway and arterial road and lane closures; construction, maintenance, and scheduled events; daily bridge opening schedules; and traffic incidents. The RIS will be supported by input from 19 participating agencies, all of which have 24-hour-a-day access to input to the system. When inputs are received, reports are generated and distributed by various media (e-mail, page, phone, or fax) to a pre-designated distribution list for dissemination. RIS improves emergency responsiveness, traffic control, and planning.

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TMS Phase II and III and Integration and Software Development

With Phase II and III implementation, the STC coverage will expand to include all of the Hampton Roads Beltway and additional portions of:

- **I-64** coverage will extend to include Chesapeake/Virginia Beach line to George Washington Highway (U.S. 17), Hampton Roads Bridge Tunnel to Granby Street (U.S. 460), Yorktown Road (SR 238) to Hampton Roads Bridge Tunnel, and then Bowers Hill to George Washington Highway (U.S. 17) and SR 199 to Yorktown Road.
- **I-264** coverage will extend to include Bowers Hill to Downtown Tunnel, Berkley Bridge to Military Highway, and Rosemont Road to Parks Avenue.
- **I-464** will be covered from Berkely Bridge to I-64.
- **I-564** will be covered from Taussig Boulevard to International Terminal Boulevard (the remainder of the spur).
- **I-664** will be covered from I-64 to Bowers Hill. (See map above for implementation schedule.)

The software development and integration portion of this ITS project is ongoing over the implementation horizon and beyond. It involves development of integration and automation software for the system. Components of the integration package include coordinating control of closed-circuit television and variable message signs, testing the core traffic management system, incident response, and closed-circuit television and variable message signs (both are complete). HOV/gate and vehicle detection components are still under development and testing.

■ 6.6 Future ITS Plans in James City County

Williamsburg Area Transport has several potential ITS initiatives to improve transit operations and traveler information. They are:

- Automatic Vehicle Location (AVL) – Provides real-time location of transit vehicles. This technology will allow dispatchers to route buses around congested areas and in emergencies; dispatch new buses in the case of incident, accident, or break-down; and provide accurate arrival information to travelers waiting for their buses.
- Interactive Kiosks – Provide traveler information and can be tied to HRATIS.
- Traffic Signal Priority – Provides priority to buses at traffic signals.

These projects are not programmed or planned at this time. Other initiatives that could benefit 2007 visitors includes:

- Integrated fare media, where a single electronic pass, such as a debit card for all transit usage in the Historic Triangle, and perhaps throughout the Commonwealth, could be introduced.
- Transit information systems, in which a traveler, using an expert system via computer or other electronic media, obtains accurate schedule information about a trip he or she wishes to make, potentially using services from several transit operators and technologies.

7.0 Parking Resources

7.0 Parking Resources

■ 7.1 Introduction

The first phase of transportation planning for Jamestown 2007 identified general parking locations for small, mid-sized, and major commemorative events. Since the first phase of work was completed, the consultant team has conducted a more thorough survey of available parking resources for 2007. The purpose of this section is to summarize work completed to date on securing parking for Jamestown 2007 shuttle bus operations and in support of expanded parking near the Jamestown Settlement and Jamestown Island. Initial findings are presented below.

■ 7.2 Findings

The consultant team surveyed available private and public parking areas in the Historic Triangle area. The team also reviewed information from VDOT about available parking resources in the general Hampton Roads area. We assessed a number of potential parking locations for their proximity, accessibility, size, and quality of the available/potential parking area. Based on our review, the best candidates in support of remote shuttle bus operations and local access/interior parking are (potential spaces in parentheses):

- I-64 North:
 - Williamsburg Pottery (500 to 1,000);
 - Eastern State Hospital (3,000+); and
 - James City County District Sports Complex (1,200).
- I-64 South:
 - Water Country USA (500 in May, 2,000 in October);
 - Busch Gardens (1,000+ in May, none in October); and
 - Cheatham Annex (1,400).
- Interior Parking:
 - Colonial Williamsburg (2,000); and
 - Jamestown Campground (3,000+).

With the exception of Eastern State Hospital, initial discussions have been held with owners or property managers of each of these properties. Letters of intent between the Commonwealth and each of the property owners should be drafted as the next step in this process.

■ 7.3 Discussion

Parking Needs

The duration, size, and timing of each commemorative event will determine the number of parking spaces needed and, to a lesser degree, the access/egress requirements. The number of visitors who arrive by rail or charter bus will have a significant impact on parking needs as well. A revised working assumption on parking needs (see Table 7.1 below) shows that as many as 8,000 parking spaces may be required for the May and October major events. Parking requirements for the mid-sized and small events have been revised to 3,300 and 1,400 respectively. These requirements reflect rather conservative assumptions about the number of visitors who will stay at hotels in Williamsburg and about the number of visitors who will use some form of transit service for their trips to Williamsburg. However, because of the uncertainties surrounding the dimensions of the 2007 events at this point, it is preferable to avoid a parking shortage than an oversupply.

Table 7.1 Potential Needs for 2007 Events

	Major	Mid-Sized	Small	Notes
Maximum Attendance	30,000	12,000	5,000	
Rail/Charter Bus	1,000	500	300	
Local Hotels	5,000	1,500	500	
Required Parking Spaces	8,000	3,300	1,400	Assume three persons/auto
Distribution				
West I-64	3,000	1,000	500	
East I-64	3,000	1,800	800	

The Phase I Jamestown 2007 report recommended an intercept shuttle bus system, with remote park-and-ride lots situated near each of the I-64/SR 199 interchanges. If we conservatively assume that a modest number of visitors will arrive at the venues by train, ferry, or from the U.S. 60 shuttle buses, roughly 3,000 parking spaces at each end of I-64 may be needed for a large-scale event, as shown in Table 7.1 above. Additional parking will be needed for local communities because the proposed locations of the remote lots are a considerable distance away from most residential clusters.

Summary of Parking Resources

A summary of feasible park-and-ride lot locations to serve remote shuttle bus and internal parking needs is presented below.

Private Facilities

Busch Gardens

Busch Gardens representatives (Daniel Brown) have indicated their willingness to provide some parking for large-scale events in May and October 2007. Ideally, located parking facilities at Busch Gardens and Water Country USA require little or no modification for any Jamestown 2007 shuttle bus operations. Water Country USA is directly accessible from I-64, Exit 238 from SR 199/Penniman Road. Busch Gardens Scotland lot is located just west of the main parking lot on U.S. 60, and is accessible from I-64 at Exit 243. Potentially, 500 parking spaces could be made available for a May 13, 2007, event and 2,000 spaces made available for an October event from the parking lot at Water Country USA. For the May 13th event, Busch Gardens will make available at least 1,000 parking spaces from the Scotland lot and possibly more, depending on Busch Gardens' own projected parking needs as the event approaches. Mr. Brown has indicated that fulfilling any additional needs for parking spaces would require an approval from corporate headquarters. No formal written agreements or letters of intent have been made regarding terms of use for the lots.

Recommendation: Determine whether any additional parking from the overflow lot will be available for the May 13, 2007, event.

Colonial Williamsburg

Colonial Williamsburg (CW) representatives (Marc Duncan) have indicated that they will make their current visitor center parking lot available as a park-and-ride lot for major 2007 activities. This paved, marked lot can accommodate 2,000 vehicles and is located directly off the Colonial Parkway and Exit 234 from I-64. However, the lot is relatively close to the center of Williamsburg; vehicles accessing the lot may contribute to traffic congestion in the "core" area. The most appropriate role for the CW lot is as a secondary access point to the shuttle bus system, for local residents and visitors staying at hotels on U.S. 60. However, if there is an insufficient amount of parking from remote sites, the CW lot could

serve as a primary lot. Formal terms for use of the lot during 2007 have not been established yet.

Recommendation: Conduct a traffic impact analysis of the CW lot as a primary access point for a shuttle bus system for travel from east- and westbound I-64. Develop a draft written agreement for use of the CW parking lot in 2007.

Williamsburg Pottery

The owners of the Williamsburg Pottery Factory have indicated that they may be able to provide some parking spaces for major Jamestown 2007 events. In addition to the Pottery Factory, the Williamsburg Pottery Campground has a large expanse of cleared, flat land that may be suitable as a park-and-ride facility for 2007. Both the Campground and Factory are conveniently located west of the SR 199/I-64 interchange. There is also an undeveloped parcel owned by the Pottery Factory just north of this interchange. The Pottery Factory is accessible either from U.S. 60, from the SR 199 interchange, or from Williamsburg Pottery Road, from the SR 199/SR 603 interchange. We estimate that 1,500 parking spaces are available for potential use.

Recommendation: Draft a letter of intent for signature by Pottery owners. Establish details concerning security and bus operations for consideration by owners. Negotiate terms of usage with owners.

Jamestown Campground

Jamestown Campground is located directly across from the Jamestown Settlement on SR 31 and thus would be an ideal overflow parking location for a mid-sized to small-scale event. Several large play fields abutting SR 31 could be used for parking, with ample space and a buffer left over for recreational vehicles further to the north of SR 31. A very quick shuttle service could transfer visitors from the campground to the Settlement or Jamestown Island. The consultant team has spoken directly with the land owner about the potential use of this property for overflow parking. No commitments could be made at this time. However, if the land has not been redeveloped by 2007, there is a good possibility that an arrangement for use of the property can be reached.

To assess the parking capacity on the Jamestown Campground site, aerial photography was used. As with the hospital site evaluation, the available parking area was divided into parking templates with 60 feet of width. The parking areas were grouped by general location of the field. Based on the parking analysis, it is estimated that the Jamestown Campground site could accommodate 3,024 vehicles.

Motorists approaching the site from I-64 and SR 199 would use either Ironbound Road and Jamestown Road or would use Monticello Avenue Extended and Greensprings Road (SR 614). Access to the site parking areas would be from Greensprings Road or Jamestown Road.

Recommendation: Maintain contacts with land owner and continue to assess availability of land as an overflow parking location.

Public Facilities

Military Facilities

Initial contacts have been established with officials from Fort Eustis and the U.S. Naval Weapons Stations. Representatives from each facility had initially expressed their willingness to work with the Logistics Transportation Working Group to provide potential parking spaces for Jamestown 2007. Surplus land at Fort Eustis will be used for new construction by 2007, thus it appears that no land for parking can be made available there. In fact, Fort Eustis has indicated that they will not be able to provide any parking for 2007 activities.

The Cheatham Annex is a naval supply center located on the York River, near the south (eastern) I-64/SR 199 interchange. In contrast to the adjacent U.S. Naval Weapons Station, no highly sensitive weapons storage facilities are located at the Annex. The Annex stages occasional open houses and permits use of its golf course by the general public. Public Information Officer James Kemp at the U.S. Naval Weapons Station has indicated that the Navy would like to participate in Jamestown 2007 commemorative activities and further has indicated that Cheatham Annex could be a viable location for Jamestown 2007 park-and-ride use. A large surplus warehouse at the Annex is scheduled for demolition within the next three years. This cleared, flat, open area could provide enough parking for roughly 1,400 spaces in 2007. Moreover, the area is near the entrance and is accessible from an adjacent service road. This would allow for the separation of automobiles and buses as they enter and leave the parking area.

Recommendation: Detail operations for potential park-and-ride facilities on this property. Indicate security and operations measures that the Commonwealth could provide. Consider providing barriers physically separating the visitor parking areas from the rest of the military facility. Parking availability at the Annex is contingent upon the nation's security status in 2007. Therefore, other possible sources of parking should continue to be pursued.

James City County District Sports Complex

The Sports Complex contains baseball, soccer, and softball fields on a large tract of land off Longhill Road. According to the County Director of Parks and Recreation, there may be enough space for as many as 1,200 parking spaces, including parking on established parking areas and unused fields. The County Director has indicated an initial willingness to provide parking for Jamestown 2007 events. The Sports Complex is accessed from Longhill Road (SR 602), via Centerville Road (SR 614), U.S. 60, and SR 199. Use of the Sports Complex fields for parking would require some traffic management measures to minimize impacts on neighboring residential communities.

Recommendation: Assess terms of use for a potential park-and-ride lot at the District Sports Complex. Assess impacts to local community of establishing a temporary park-and-ride lot.

Eastern State Hospital

Eastern State Hospital is a large, state-owned mental health care facility and the oldest public psychiatric hospital in the nation. It is located roughly three miles south of I-64, Exit 234, and conveniently accessible from SR 199 and Ironbound Road. Operations at the facility have slowed considerably in recent years (currently, there are 500 patients at the hospital), leaving a considerable amount of surplus property for potential redevelopment. However, there are no plans to sell the property for private development at this time. Current plans for this land include the construction of a satellite campus for the Thomas Nelson Community College. Because the College serves commuting students, the facility would require several thousand parking spaces, on paved, marked, and lighted lots – an ideal resource from the perspective of Jamestown 2007 parking needs. In addition, the facility has a number of large, grassy fields that could be used for parking as well.

To assess the parking capacity of the Eastern State Hospital site, a site visit was conducted to evaluate usable parking areas and access routes. Next, aerial photography and topographic data were evaluated. As a result, two areas were eliminated from consideration for parking because of steep slopes.

The remaining useable area was divided into parking templates with 60 feet of width. This permits parking spaces with dimension of nine feet in width and 18 feet in length on either side of a 24-foot wide drive aisle. The parking areas were grouped by general location of access. The overall capacity of the parking areas is estimated at 3,026 spaces.

Access to the parking areas would be oriented from I-64 and SR 199 to the facility via Longhill Connector Road. The Longhill Connector Road approaches to Ashbury Road provide separate left- and right-turn lanes. Motorists would enter on Ashbury Road or continue southeast to the Ironbound Road intersection and enter the facility on Galt Drive. Once inside the facility, motorists on Ashbury Road would be directed to parking areas via Garrett Road, or Foster Road, or Henley Drive. Motorists on Galt Drive would be directed to parking areas via Minson Road and Henley Lane.

Recommendation: Assess terms of use for potential park-and-ride lot at Eastern State Hospital Complex. Assess impacts to local community of establishing a temporary park-and-ride lot.

Mainland Farm

Mainland Farm is a large parcel of land owned by James City County located on Greensprings Road, near Jamestown Settlement. This parcel is actively farmed and has no facilities for parking at this time. There are no plans to develop the site at this time. In order to use this site for parking, traffic management measures (signage, police presence) would be implemented to guide visitors and to minimize impacts to local residents. The Phase I Jamestown 2007 transportation plan identified this site as appropriate for a mid-sized event, with remediation measures so as to maintain the quality of the land for agricultural uses. However, James City County officials have recently indicated that they do not wish to disturb the land and prefer to maintain it as productive farmland.

Recommendation: Consider other more appropriate locations, such as the Jamestown Campgrounds, for mid-sized event parking.

Hampton Roads Facilities

A number of large parking facilities in the Hampton Roads area include Thomas Nelson Community College, Hampton Coliseum, and a commercial lot near Military Circle in Norfolk. These three lots combined would provide more than 3,000 parking spaces. These lots are a considerable distance from Jamestown, and bus operating expenses for a shuttle bus service using these lots would be considerably higher than those for closer-in parking lots.

Recommendation: Establish contacts with property managers to ascertain parking space availability at these major properties in the Hampton Roads area.

Undeveloped Parcels

Undeveloped land parcels initially considered good candidates for temporary park-and-ride lots are being considered for development by 2007. Two parcels – one a surplus state-owned property on Pettiman Road near Cheatham Annex and the second a large, relatively inaccessible, privately owned parcel – will probably be developed by 2007 according to York County officials. A third parcel considered is a state-owned parcel located south of SR 199, west of the I-64/SR 199 interchange. This parcel has been used for construction fill by VDOT and is accessible via an overpass over SR 199, which leads to a small residential community and industrial park. The site would require considerable clearing, back-fill, and grading, because of the steep topography on the back side of the parcel. A temporary median cut would be required to allow eastbound, left-turning vehicles to access the site directly without using the SR 199 overpass.

Recommendation: Ascertain feasibility of park-and-ride lot on VDOT surplus property. Establish construction requirements and cost estimates.

Parking Survey

The consultant team assessed a number of potential parking locations to support of Jamestown 2007 activities. For this assessment, the team visited most sites to evaluate their capacity, ability to accommodate bus traffic, proximity to other large parking lots, and proximity to the regional highway system. The consultant team photographed the sites from various perspectives to illustrate how they above sites might accommodate bus traffic and function as satellite parking sites. In addition to photographing these sites, the surveyors investigated the number of parking spots available at each location, either by manual counting or by asking the property manager in charge of each site. Table 7.2 below summarizes the findings of this survey, and includes information on additional facilities that might be used for satellite parking in 2007. Maps of these potential parking locations are displayed in Figures 7.1 and 7.2. The identification number of each parking

location shown in the table corresponds to numbered locations on the maps. The tabular data is broken down into columns containing the following information:

1. Name of the facility;
2. Address or cross street closest to the facility;
3. Property manager's willingness to participate;
4. Number of spaces available;
5. Facility's distance to Jamestown;
6. Facility's distance to SR 199;
7. Brief description of the facility's layout and accessibility;
8. Cost of capital improvements necessary for use of the facility (grading, gravel);
9. Impact using the facility would have on local traffic; and
10. Facility's appropriateness for large, medium, or small events.

**Table 7.2 Jamestown 2007 Satellite Parking
Southside Remote Access**

ID#	Facility Name	Address/ Cross Street	Willing to Participate	Number of Spaces	Proximity to Jamestown (Miles)	Proximity to SR 199 (Miles)	Access/ Configuration	Cost	Resident Impact	Event Size
9	Hampton Coliseum	1000 Coliseum Drive, Hampton, 23666	N/A	3,000+	33.33	23.04	Good	Low	Low	Large
11	Christopher Newport University	1 University Place, Newport News, 23606	N/A	3,119	28.81	18.68	Good	Low	Low - High depending on whether class is in session	Medium
4	U.S. Naval Weapons Station	Old Williamsburg Road at Turkey Road	Yes	N/A	14.45	5.01	Not surveyed	Low	Low	Large
10	Fort Eustis	U.S. Army Transportation Center, 23604	No	0	20.26	5.92	Not surveyed	Low	Low	Large
5	City of Newport News Park and Ride	Old Courthouse Road; Route 238 and Route 143	N/A	325	16.72	6.49	Good	Low	Low	Medium
6	York County Park and Ride	Interstate Highway I-64; Route 646 and Route F-137	N/A	75	8.76	0	Poor	Low	Low	Medium
12	Isle of Wight County Park and Ride	Bartlett Lott	N/A	50	54.03	49	Good	Low	Low	Medium
10	Surry County Park and Ride	Route 31 and Route 637	N/A	70	5.13	N/A	Fair	Low	Low	Medium
2, 3, 7	Gloucester County Park and Ride	Route 216 and Route 17; Route 1216; Route 374	N/A	540	25.01	15.26	Good	Low	Low	Medium

**Table 7.2 Jamestown 2007 Satellite Parking (continued)
SR 199 West Access**

ID#	Facility Name	Address/ Cross Street	Willing to Participate	Number of Spaces	Proximity to Jamestown (Miles)	Proximity to SR 199 (Miles)	Access/ Configuration	Cost	Resident Impact	Event Size
15	Cheatham Annex	Sanda Avenue (641) and the Colonial Parkway	Yes	1,400	12.52	2	Good	Low	Low	Large
14	Busch Gardens	Richmond Road and Merrimac Trail at Exit 243 of I-64	Yes	1,000+	21	1	Huge, easy bus access	Low	Low	Large
16	Busch Corporate Center	1 Busch Garden Boulevard, Williamsburg, 23187	N/A	300	20	0.2	Collection of small lots around McLaw circle	Low	Low	Large
20	Water Country USA	Old York Road and Water Country Parkway	Yes	500 to 2,000	10.77	1.5	Huge, built for bus access	Low	Low	Large

Table 7.2 Jamestown 2007 Satellite Parking (continued)
SR 199 East Access

ID#	Facility Name	Address/ Cross Street	Willing to Participate	Number of Spaces	Proximity to Jamestown (Miles)	Proximity to SR 199 (Miles)	Access/ Configuration	Cost	Resident Impact	Event Size
22	Gallery Shops	Richmond Road at Lightfoot Road	N/A	95	10.78	.49	Strip mall, turn lane off U.S. 60 provides easy bus access	Low	Low	Medium
23	Pottery	Richmond Road and Williamsburg Pottery Road	Yes	500 to 1,000	11	.50	Huge, very bus accessible, entry has turn lane, exit has traffic light	Low	Low	Large
30	Prime Outlets	5715 Richmond Road	No	500	20.54	1.52	Huge, bus accessible, but raised walkways in middle of parking lot act as speed bumps; very bus accessible	Low	Medium	Large
28	Post Office Complex	Richmond Road at Lightfoot Road	N/A	100	10.78	.44	Strip mall, turn lane off U.S. 60 provides easy bus access	Low	Low	Medium
29	Williamsburg Outlet Mall	Richmond Road at Lightfoot Road	Yes	350	10.78	.46	Large, very bus accessible	Low	Low	Large
25	James City County District Park Sports Complex	Warhill Road off State Highway 612	Yes	1,200	20.32	1.3	Will need a lot of signs, easy to miss entrance; access road narrow	Low	Medium	Medium
21 26	James City County Park and Ride	Route 30 and Route 607	N/A	75	14.90	4.87	Poor	Low	Low	Medium

**Table 7.2 Jamestown 2007 Satellite Parking (continued)
SR 199 East Access (continued)**

ID#	Facility Name	Address/ Cross Street	Willing to Participate	Number of Spaces	Proximity to Jamestown (Miles)	Proximity to SR 199 (Miles)	Access/ Configuration	Cost	Resident Impact	Event Size
27	Pavilion Shops	Richmond Road at Lightfoot Road	N/A	190	10.78	.48	Strip mall, turn lane off U.S. 60 provides easy bus access	Low	Low	Medium
33	Ewell Station and AMF	5601 Richmond Road	N/A	250	9.73	1.83	Two lots facing each other, one with speed bumps, but very bus accessible	Low - High if new gravel laid on existing grassland	Medium	Medium
36	William and Mary	200 Richmond Road	N/A	4,413	7.22	5.48	Large, good pick-up points for buses	Low	High	Medium
35	Lowes	801 Rochambeau Drive	No	200	12.30	1.14	Good access to SR 199, large lot	Low	Low	Medium
43	Lafayette HS	4460 Longhill Road, 23188	N/A	200	9.24	1.65	Good, made for bus use	Low	Low	Medium
41	Bruton HS	185 East Rochambeau Drive, 23188	N/A	400	11.62	5.64	Good, made for bus use	Low	Low	Medium

Table 7.2 Jamestown 2007 Satellite Parking (continued)
Local Access

ID#	Facility Name	Address/ Cross Street	Willing to Participate	Number of Spaces	Proximity to Jamestown (Miles)	Proximity to SR 199 (Miles)	Access/ Configuration	Cost	Resident Impact	Event Size
47	Colonial Williamsburg Visitors Center	Colonial Parkway near SR 132	Yes	2,000	8.91	N/A	Excellent access and signage	Low	Low	Medium
38	Mainland Farms	Greensprings Road and 4-H Club Road	No	0	0.2	N/A	Poor access, crumbling pavement on Greensprings and 4-H Club Road	High	Medium	Medium/ Small
46	Clara Byrd Baker Elementary School	3131 Ironbound Road	N/A	100	3.72	N/A	N/A	Low	Medium	Medium/ Small
42	Jamestown HS	3751 John Tyler Highway, 23185	N/A	200	4.41	N/A	Good, made for bus use	Low	Low	Medium
44	Eastern State Hospital	Ironbound Rd Longhill Connector	Yes	3,000+	8.5	1	Fair-good Turning lanes from main roads	Low	Medium	Large
48	Jamestown Campground	SR 31	Yes	3,000+	0.2	2.1	Right turn in from SR 31	Medium	Medium	Medium/ Small

Figure 7.1 Potential Park-and-Ride Lot Locations

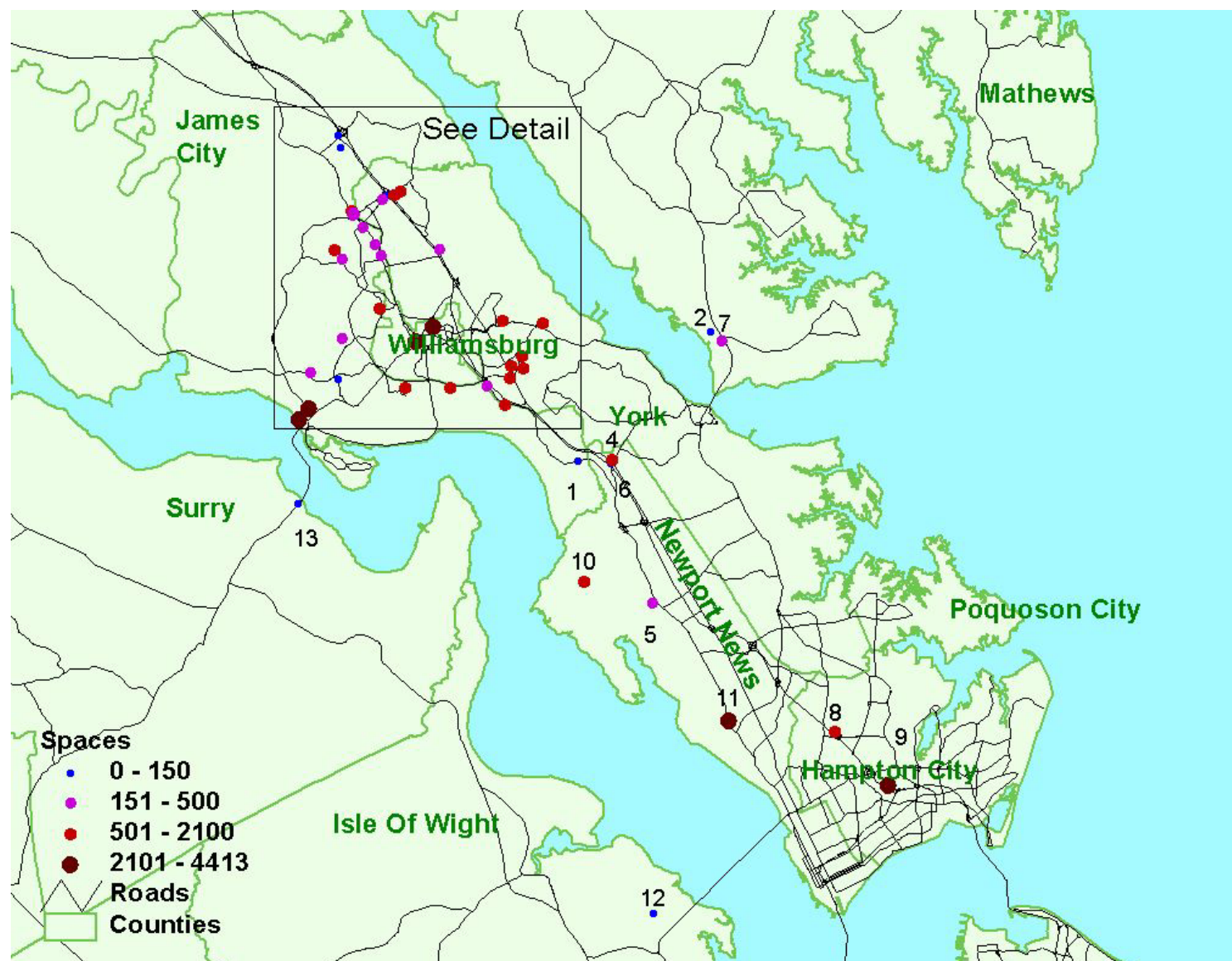
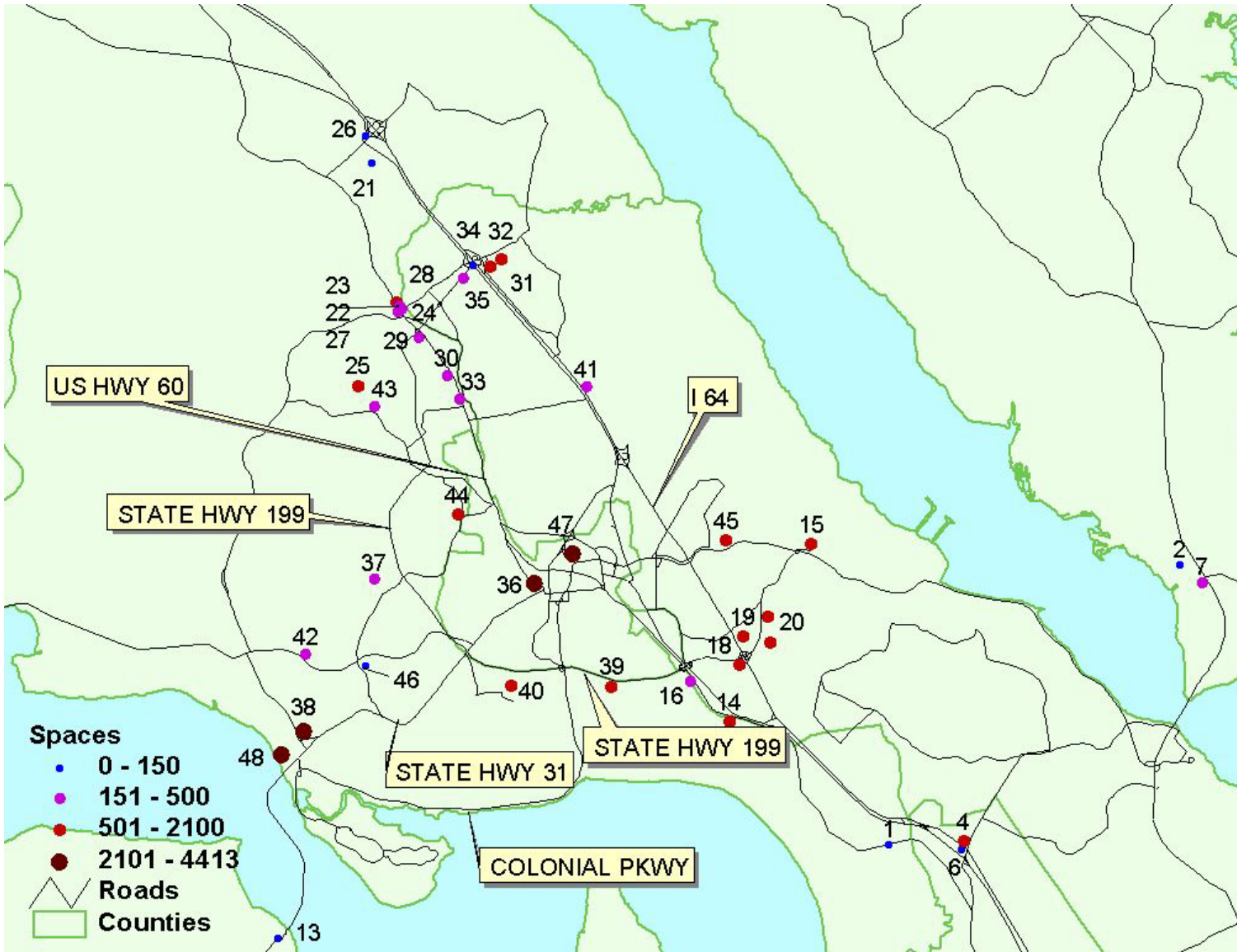


Figure 7.2 Potential Park-and-Ride Lot Locations (Detail)



8.0 Non-Auto Access

8.0 Non-Auto Access

This section discusses intercity travel options to the Historic Triangle, including waterborne travel via the Jamestown-Scotland Ferry. Commercial air transportation, passenger rail, intercity bus, and ferry service are considered in turn.

■ 8.1 Commercial Air Transportation

People traveling via commercial airlines to the Historic Triangle area can use either the Richmond International Airport or the Norfolk International Airport. Currently there are shuttle services from both of these airports to the Historic Triangle area.

Richmond International Airport

The Richmond International Airport (RIC) is located about seven miles southeast of the city of Richmond. The airport is served by seven major air carriers and provides non-stop service to 22 cities. RIC is currently undergoing an extensive renovation and expansion, which should be completed in 2006. The travel time by automobile from the Richmond airport to the Williamsburg area is about one hour.

Hourly shuttle service from the airport to the Williamsburg area is currently provided by Groome Transportation. This service could be enhanced to provide a higher level of service for the expected increase in visitors for Jamestown 2007.

Public bus transit is also provided to RIC by the Greater Richmond Transit Corporation (GRTC). The current service is oriented toward bringing employees who live in Richmond to and from the airport, with peak-hour service only.

Norfolk International Airport

The Norfolk International Airport (NIA) is located on Norview Avenue in Norfolk. There are seven major carriers that serve NIA, as well as several regional carriers. NIA is about 44 miles from Williamsburg.

There is shuttle service available from NIA to the Williamsburg area through Brown's Airport Sedan. Brown's provides service from the airport to most of the Hampton Roads Area. This shuttle service could also be enhanced to accommodate the increased visitation that will be associated with Jamestown 2007.

■ 8.2 Passenger Rail

Current Services

Passenger rail service in the region is currently provided by Amtrak along the CSX corridor from Richmond to Newport News, with a stop in Williamsburg at the Williamsburg Transportation Center. There are currently two trains per day in each direction. The current service operates using five- to nine-car trains, for a total train capacity of between 350 and 630 passengers per train. At four trains per day (two in each direction), Amtrak's regularly scheduled services can serve between 1,400 and 2,500 passengers per day on this corridor. If half of this capacity is available for the Williamsburg station, then between 700 and 1,250 people could use Amtrak to reach Williamsburg with the existing level of service. Additional cars could be added to accommodate increased demand, up to a train length of 15 to 18 cars, provided adequate notice is provided. If Amtrak were to run trains of this increased length for the event, they could bring between 3,000 and 4,000 passengers in per day (again, assuming some of the capacity is not going to Williamsburg).

Potential Expanded Rail Service

The Virginia Department of Rail and Public Transportation is currently exploring the possibility of expanding rail service in the Richmond-Newport News corridor so that commuter rail service can be provided. The preliminary proposal includes service on the CSX tracks from Richmond's Main Street Station with stop locations in Williamsburg, Lee Hall, and Newport News. Three DMU-type trainsets have been proposed, with two in daily service and one spare. One trainset would begin service in Richmond and the other in Newport News. Each would make one round trip daily.

The preliminary cost estimate for the needed track improvements on this corridor is \$17,321,160, and the capital lease on equipment for the trains is estimated to be \$2,640,000, for a total capital cost of \$19,961,160. The estimated annual operating costs (for weekday service only) are \$4,782,015.

A budget amendment is currently before the Virginia General Assembly to provide funds to study the feasibility of commuter rail for this corridor. If this funding is approved, then the study would take place in 2003, with the results available in 2004 and, if deemed feasible, construction in 2005.

While commuter rail may be helpful to the corridor for enhanced mobility and traffic mitigation, the type of service proposed (Monday through Friday, one commute trip in each direction) would not likely be optimal for bringing large numbers of visitors to the area for Jamestown 2007; however, the proposed capital improvements that accompany the commuter rail service would potentially improve the possibility of adding other passenger services for the events.

Rail Planning Process

CSX owns the tracks on the Richmond-Newport News corridor. Amtrak currently has the equipment, insurance, and agreements in place to provide passenger rail service in the corridor. Given the current scenario, it is appropriate for the Jamestown 2007 Committee and/or the Virginia Department of Rail and Public Transportation to develop a joint proposal with Amtrak for any additional service needed for Jamestown 2007, and then present this proposal to CSX. The least costly alternative would be to add additional cars onto existing schedules. It would be significantly more expensive to expand the existing schedule, both in terms of negotiating with CSX and in terms of equipment and operators. CSX has indicated that such a proposal should be submitted about two years prior to the needed service.

■ **8.3 Intercity Bus**

Greyhound/Carolina Trailways

Regularly scheduled intercity bus service is provided to Williamsburg along the I-64 corridor between Richmond and Newport News. There are currently eight buses daily in each direction that serve the Williamsburg Transportation Center.

Additional capacity could be added in the corridor to handle the increased demand for service that is likely to be associated with Jamestown 2007, much like is done for schedules that serve seasonal destinations.

Tour Buses

Tour bus operators from around the country are likely to include Jamestown 2007 trips as part of their offerings in 2007. It will not be possible to accurately estimate how many buses might be bringing visitors to the region until the venues are decided and the tour operators can plan their packages. Typically a tour bus package will include tickets to the event, as well as lodging and some meals, depending upon the distance from the trip origin. The tour bus mode has the potential to bring in relatively large numbers of visitors.

Express Buses

In addition to regularly scheduled intercity buses and tour buses, it may also be appropriate to provide express bus service from the Washington/Richmond area and from specific points in the Hampton Roads area to the venues. These express buses would serve the “day-trip” market and would further mitigate additional cars using I-64. These services would operate similarly to the tour buses, only without the lodging and meals.

■ 8.4 Jamestown – Scotland Ferry

Since shortly after the establishment of Jamestown, some form of ferry service has been operated across the James River between Jamestown Island and the community of Scotland in Surry County. Originally a private, for-profit venture, the Jamestown-Scotland Ferry has been operated by the Virginia Department of Transportation and its predecessor agencies since 1945. At the present time, a fleet of four ferry boats – the “Pocahontas,” the “Williamsburg,” the “Surry,” and the “Virginia” – transport passengers and vehicles across the river 24 hours a day, 365 days a year. The passenger and vehicle capacity and year of manufacture of the vessels in the current fleet are presented in the Table 8.1 below.

Table 8.1 Current Jamestown-Scotland Ferry Fleet

Vessel	Year of Manufacture	Passenger Capacity	Vehicle Capacity
Pocahontas	1995	500	70
Williamsburg	1983	355	50
Surry	1979	361	50
Virginia	1936	192	28

A new 70-car capacity ferry is planned for construction in 2003-2004 to replace the oldest and smallest vessel, the “Virginia.” When the new ferry is placed in operation in mid- to late 2004, the fleet will consist of two 50-car capacity ferries and two 70-car capacity ferries. This fleet composition is anticipated to remain constant for the next 10 to 15 years.

Ferries are generally scheduled to depart from Glasshouse Point at Jamestown Island and Scotland once every 30 minutes throughout the day, with a 20-minute service frequency operated during morning and afternoon peak periods. During periods of very heavy demand, all four of the current vessels can be placed in operation. There are presently

two vehicle loading ramps at the Jamestown terminal and three ramps at Scotland. Thus, there is enough physical space available to accommodate all four vessels at one time at the terminals. However, the time required for the loading and unloading of the larger 70-car capacity ferries is viewed by VDOT staff as the constraining factor on the frequency of service that can be provided.

A crew of six persons is required to operate each vessel. While current staffing levels are adequate to maintain a service level of two or three vessels on a regular basis, VDOT staff have indicated that there is a continuing shortage of trained and licensed crew members.

Another capacity limitation on the ferry fleet is the U.S. Coast Guard-rated maximum passenger capacity on each vessel, generally defined as the number of life vests carried on each vessel. The largest, 70-car capacity ferry is rated for a maximum of 450 passengers, while the smaller 50-car capacity vessels are each rated for a maximum of 350 passengers and the 28-car capacity "Virginia" is rated for a maximum of 190 persons. Thus, regardless of the specific mix of vehicles and walk-on passengers on a specific vessel, its maximum capacity is determined by the U.S. Coast Guard rating. With a loading pattern of all 50-passenger buses, for example, the smaller 50-car ferries could transport no more than seven buses, while the larger 70-car ferry could transport no more than nine buses. As an operational policy, no more than six buses are now allowed on board either the large or small ferries with other cars. From a safety perspective, VDOT staff have suggested that any ferry trips operated in connection with Jamestown 2007 events be either 100 percent walk-on passengers or 100 percent passengers in vehicles, preferably buses. In their view, a 100 percent shuttle bus system would probably be the most effective means of transporting large numbers of persons between Surry County and events at either Jamestown Island or the Jamestown Settlement venues.

Table 8.2 displays the number of vehicles transported each month on the Jamestown-Scotland Ferry from January 1997 through November 2002. As shown on this table, annual utilization has steadily increased over the past few years, from 757,602 vehicles in 1997 to 927,137 vehicles in 2001. This represents an increase in the number of vehicles transported annually of 169,535 in a period of only four years, or about a 22.4 percent overall increase. Comparing the period of January to November 2001 to the same period in 2002, there has been a net increase in usage of 11,297 vehicles, or about a 1.3 percent year-to-date increase.

Comments from VDOT staff indicate that the increased use of the ferry system appears to be attributable to both greater tourist use, particularly during summer months, and increased use by daily commuters between the north and south sides of the James River.

The operating costs of the system have remained relatively stable over the past few years, typically increasing at a rate of only about two to three percent per year. The general maintenance and upkeep costs of each vessel in the fleet averages \$181 per hour. Crew costs (for each six-person crew) are approximately \$93 per hour for regularly scheduled service and \$139 per hour for overtime/extra service. Total estimated operating costs are thus about \$274 per hour for regular service and \$320 per hour for overtime/extra service.

Table 8.2 Jamestown-Scotland – Vehicles Transported

Month	1997	1998	1999	2000	2001	2002
January	44,848	52,837	57,636	48,840	59,608	60,119
February	43,290	47,849	55,706	56,330	56,318	61,007
March	57,055	61,330	65,774	68,584	68,880	75,224
April	57,481	68,311	77,501	75,609	78,234	81,986
May	60,382	75,947	83,444	81,848	82,425	84,999
June	67,696	77,577	82,571	84,561	84,068	89,252
July	81,721	87,529	91,598	93,546	94,484	94,280
August	81,691	82,822	85,582	87,025	86,952	87,471
September	67,939	74,087	65,174	77,638	77,350	77,318
October	72,320	81,543	77,361	86,097	87,771	80,517
November	62,557	72,656	70,422	69,596	78,269	73,483
December	60,622	63,996	67,716	65,076	72,778	
Totals	757,602	846,484	880,485	894,750	927,137	865,656
Increase Over Previous Year		88,882	34,001	14,265	32,387	-61,481
Percent Increase Over Previous Year		11.7%	4.0%	1.6%	3.6%	-6.6%

9.0 Estimated Costs and Financial Plan

9.0 Estimated Costs and Financial Plan

■ 9.1 Introduction

This section of the Phase II final report presents an updated cost estimate for the transportation services and operations associated with the currently anticipated Jamestown 2007 activities. Estimates are provided for bus services and operations, traffic management, communications, event-related parking, and a portion of the expected security, coordination, and promotion activities. Estimated costs for capital investments that would serve visitor demands in 2007 but that remain in operation afterwards are included as well. As was the case with the Phase I cost estimates, we assume that there are two major events that will occur in 2007. Each identified event is assumed to occur at one scheduled time, with all visitors arriving at the venue within a three-hour period of time. All cost estimates presented here will be further updated and revised once more is known about the specific times, dates, and itineraries of all Jamestown 2007 events.

This cost estimate section begins with a description of critical and regionally significant projects that are already funded through VDOT's six-year program, and projects whose funding is beyond the scope of this effort. This discussion is followed by a description of funding needs for large, mid-sized, and yearlong events.

■ 9.2 Regionally Significant Transportation Projects

Highway Projects

Virginia's six-year highway improvement program for the Hampton Roads District has remained largely unchanged for the past two years. Given the Commonwealth's current fiscal situation, VDOT has focused its efforts on funding and completing priority projects before any new projects are added to the program. These projects are believed to be fully funded through current funding mechanisms and should require no further funding allocations beyond those now in place. LTWG members should continue to closely monitor the progress of these construction projects and work to ensure their completion by no later than early 2007.

Regionally significant highway projects with sufficient funding for completion by 2007 include:

I-64. The widening project that begins south of James City County and continues south to the city of Hampton includes a short, six-lane section to U.S. 17 in Newport News followed by an eight-lane section with an HOV lane. A new interchange at Bland Boulevard near Jefferson Boulevard (SR 143) is also scheduled for completion by 2007. The entire corridor from the Hampton Roads Bridge-Tunnel to the west SR 199 interchange will be served by the Hampton Roads Traffic Management Center. Overhead dynamic message signs, video surveillance, and the deployment of rapid-response emergency assistance vehicles will provide VDOT with additional capabilities to react quickly to accidents and incidents.

SR 199. Intersection improvements to the SR 199/SR 31 intersection and the completion of the widening of SR 199 to four lanes from the SR 199/SR 31 intersection to the east will be completed through a public/private partnership, design/build contract between VDOT and the Jamestown 2007 Corridor Constructors, a consortium of construction contractors. Construction is scheduled for completion by 2005.

SR 359. The two-lane access road between SR 31 and the Colonial Parkway at the Jamestown Settlement is being realigned away from the main entrance to eliminate vehicular/pedestrian conflicts. This work is being undertaken by the Jamestown 2007 Corridor Constructors as part of the design/build contract covering the SR 199 improvements.

A complete list of these significant projects and funding levels are listed in Table 9.1 below. The value of these projects, including the purchase of a ferry for the Scotland ferry service described in Section 9.3.1, is estimated at more than \$298 million.

Transit Projects

Main Street Station. One of the most significant regional transit projects beneficial to Jamestown 2007 is the relocation of the Richmond's Amtrak railroad station from Staples Mill Road to the historic Main Street Station in downtown Richmond. The Main Street Station will be restored as a multimodal transportation center serving Amtrak regional rail service with local and regional surface transportation services. Between 2003 and 2007, VDOT and the Department of Rail and Public Transportation will also complete track improvements between the existing station at Staples Mill Road and the Main Street Station. The relocated station and rail improvements will greatly enhance the accessibility and attractiveness of rail service in the Washington-Richmond and Richmond-Williamsburg corridors. The Commonwealth Transportation Board's FY 2003 Public Transportation Improvement Plan indicates funding levels for the Main Street Station at \$6.5 million through FY 2006.

Table 9.1 Estimated Costs for Regionally Significant and Funded Highway Elements

Project Name	Project Description	Location/Extent	Funding FY 2002-2003 to FY 2007-2008 (\$ Thousands)	Status	Significant Dates
I-64	Widening of interstate 0064-114-114	0.6 miles east of U.S. 17 to Ramp B of I-664 interchange in Newport News and Hampton (widen six to eight lanes)	\$92,265	Construction Underway	Estimated completion date - Fall 2005
		1.5 miles west of SR 143 (Jefferson Avenue) to 0.3 miles east of U.S. 17 in Newport News (four to six lanes)	41,303	Complete	
	ITS - Traffic Management System 0064-965-113	From Hampton Roads Bridge/Tunnel in Hampton to SR 199 in James City/County	33,014	Construction Underway	Estimated completion date - Summer 2004
		North end of Monitor-Merrimac Tunnel to Hampton Corporate Limits in Newport News			
	Interchange Improvements 0064-121-111	I-64 and Bland Boulevard Near Newport News-Williamsburg International Airport in Newport News	70,390	FHWA is reviewing the need for this project	Current projected advertisement - Fall 2006
U.S. 17	Widening four to six lanes 6017-099-129	Between SR 630 and SR 134 in York County	17,032	Planned	Current projected advertisement - Fall 2008
U.S. 60 and SR 607	Intersection improvement - add right-turn lane 0060-047-115	U.S. 60 and SR 607 (Croaker Road) in James City/County	212	Planned	Current projected advertisement - Summer 2004

**Table 9.1 Estimated Costs for Regionally Significant and Funded Highway Elements
(continued)**

Project Name	Project Description	Location/Extent	Funding FY 2002-2003 to FY 2007-2008 (\$ Thousands)	Status	Significant Dates
The following four projects are to be completed by 2007.					
SR 199	Widening, Parallel Lane Phase I 0199-047-110	2.0 miles West Route 60 (Pocahontas Trail) – 0.3 miles West Route 60 (Pocahontas Trail)	Combined into 1 contract	Planned – PPTA	Construction Underway
	Widening, Parallel Lane Phase II 0199-047-110	0.6 miles East Route 31 (Jamestown Road) – 1.7 miles East Route 31 (Jamestown Road)	Combined into 1 contract	Planned – PPTA	Construction Underway
	Intersection Improvements 0199-965-104	Between SR 5 and Brookwood Drive in James City/County	Combined into 1 contract	Planned – PPTA	Construction Underway
SR 359	Relocation of Entrance to Jamestown Settlement 0359-047-101	SR 359 at the entrance to Jamestown Settlement in James City/County	Combined into 1 contract	Planned – PPTA	Construction Underway
PPTA Contract Total			\$31,408		
	Jamestown Ferry	70-passenger car ferry for the Jamestown Ferry (500 passenger capacity)	\$12,000	Currently being purchased	Ferry projected to be operational by Summer 2006
Total of All Projects			\$297,624		

Richmond-Washington Rail Corridor Improvements. The Richmond-Washington rail corridor is slated for a number of operational improvements that will increase speeds, safety, and capacity for the passenger and freight lines operating in the corridor. Improvements include the installation of cross-over tracks to allow for parallel freight/passenger rail movements and improved signal and switching systems. These improvements will allow commuter rail and Amtrak service to operate at higher speeds and at higher frequencies. Capital cost estimates for the high-speed rail projects are \$18.2 million each for the Richmond and Fredericksburg districts, and \$29.2 million for the Northern Virginia district. Many individual projects are fully funded through the Priority Transportation Fund of the Virginia Transportation Act of 2000.

Local Transit System Improvements. The public transit agencies serving, respectively, the Williamsburg, Hampton Roads, and Richmond areas will be seeking funding for normal vehicle replacement and for some expansion of existing services. In particular, Williamsburg Area Transport's Long-Range Plan calls for the acquisition of two new full-sized transit buses, which will enable it to expand its services to underserved areas. Lastly, the Colonial National Historical Park (CNHP) is considering the purchase of new transit buses for the operation of a shuttle bus service that would connect the Yorktown Battlefield and Jamestown Island with other local attractions, including Colonial Williamsburg and Jamestown Settlement, via the Colonial Parkway. The Williamsburg Area Transport and CNHP purchases will add a significant capability to local transit services to visitors to the Historic Triangle in 2007. However there are no funding sources allocated to these capital investments at this time. Thus, they are included in the funding needs described for 2007.

Total funding for the regionally significant transit projects is \$72.2 million, as shown in Table 9.2 below.

Table 9.2 Estimated Costs for Regionally Significant and Funded Regional Transit Elements

Project Name	Project Description	Funding FY 2002-2003 to FY 2007-2008 (\$ Thousands)	Status
Main Street Station	Richmond Station relocation and creation of intermodal terminal	\$6,566	Construction Underway
High-Speed Rail Corridor	Installation of new switches, signals, and cross-over tracks	65,600	Construction Underway
Total		\$72,166	

Richmond-Newport News rail corridor improvements. The Virginia Department of Rail and Public Transportation is considering additional improvements to the single-track rail line between Richmond and Newport News similar to those planned for the Washington-Richmond corridor. A proposed commuter rail service would operate a passenger service between Richmond and Newport News on a schedule oriented to commuter travel. Needed improvements to the CSX-owned track and a lease of three DMU totaling \$19,961,100. Annual operating costs are estimated at \$4,782,000. However, no funds have been dedicated or allocated for these improvements.

**Table 9.3 Estimated Rail Costs for Jamestown 2007 Transportation System:
Unfunded Commuter Rail Project**

Service	Yearlong	Mid-Sized	Major	Total
Rail Purchase	\$19,961,100			\$19,961,100
Rail Operations	4,782,000			4,782,000
TOTAL	\$24,743,100			\$24,743,100

■ 9.3 Large-Scale Events

The basic outlines of the large-scale event services are unchanged from the Phase I plan. For the two “mega” events scheduled for May and October, shuttle services would transport visitors from several remote locations to the Jamestown 2007 events via the Colonial Parkway, which would be open to bus-only traffic. Transit buses operating at high frequencies would collect visitors from remote parking lots located near the west (north) and east (south) ends of SR 199, near the I-64 interchanges, and another at Colonial Williamsburg. Other buses would collect visitors at bus stops located along U.S. 60 (Richmond Road).

The estimates presented below are based on private-sector charter rates and do not assume any “in-kind” contribution by any public-sector agencies. Such contributions are likely and, if they occur, may substantially reduce costs from the estimates provided here.

9.3.1 Access to Historic Triangle

The major 2007 commemorative events will attract a substantial number of visitors who will drive to the Historic Triangle from their homes in the Hampton Roads region and beyond. Because the expansion of I-64 beyond its current four-lane cross section will not occur until after 2007, providing access to alternative modes of travel is a reasonable step to reduce traffic congestion, especially for the May 13, 2007, “blockbuster” event. Currently Amtrak operates two trains (four one-way trips) daily between Richmond and Newport News, with stops at Williamsburg. One option for expanding rail service in the corridor that is achievable by 2007 is to institute a commuter rail service along this rail corridor, and continue the service as a legacy project beyond 2007. (Cost estimates for commuter rail are presented in the Yearlong section below.) A temporary, less costly option is to contract additional service from Amtrak to serve the weekends of peak demand in May and October of 2007. For a service offering 12 one-way trips daily between Richmond and Newport News for two weekends, one in May and the second in October, the total estimated operating costs are \$155,300.

**Table 9.4 Estimated Costs¹ for Richmond-Newport News Rail Services:
Two Major Events**

Service	Description	Estimated Costs
May 13 Amtrak Service	12 One-Way Trips per Day for Three Days	\$93,200
October 10 Amtrak Service	12 One-Way Trips per Day for Two Days	62,100
TOTAL (Two Events)		\$155,300

¹ Estimates based on commuter rail operating costs.

Surry County – Jamestown travel will continue to be served by ferry. VDOT currently has four ferries available for operation and currently operates ferries at 20- to 30-minute intervals. A 70-passenger car ferry, which will replace one of the smaller ferries, is being purchased and will be in operation by 2007. Increasing ferry frequencies for the major events would serve additional visitor demand from the SR 460/U.S. 17 corridors. The cost estimates for increased ferry service shown in Table 9.5 assume that the additional service can be provided with the existing four ferries. Service frequencies are assumed to double during peak periods of demand during the May 13 event (three days) and the October 10 event (two days).

Table 9.5 Estimated Costs for Additional Surry County – Jamestown Ferry Service

Service	Cost/Hour	Total Operating Costs (12-Hour Event Day)
Operating Costs	\$181	\$8,688
Crew Costs (regular)	93	2,232
Crew Costs (overtime)	131	3,144
TOTAL (Per Event Day)		\$14,064
TOTAL (Two Event Days)		\$28,128

Source: VDOT.

9.3.2 Parking

Currently, we estimate a need for 6,000 total parking spaces at the I-64 remote lots. For parking at the east end of I-64, Busch Gardens has informally agreed to provide 1,500 spaces for a May event and 2,000 for an October event. An additional 1,000 to 1,500 spaces of remote parking is needed for the east side. Officials at the Cheatham Annex Naval Facility have indicated their willingness to participate in Jamestown 2007 commemorative activities and have identified a site for potential use as a remote park-and-ride lot. However, the Department of Defense can make no firm commitments to provide parking at this time. Potential locations for additional parking are under review. Representatives of Eastern State Hospital and the James City Sports Complex have signaled their willingness to work with the LTWG to provide parking on the west side of I-64. We estimate that there is enough land to provide at least 3,000 parking spaces from these two sites. Lastly, Colonial Williamsburg is making available a 2,000-space parking area for Jamestown 2007 events.

Table 9.6 below presents revised cost estimates for parking. For these estimates, it was assumed that the amount of earthwork needed to prepare the fields at Eastern State Hospital and the District Sports Complex would be minimal. Lighting, fencing/barriers, security, and attendant costs are included. Attendants would be responsible for collecting any parking fees collected at the parking site. Additionally, it is assumed that some paved parking spaces would be leased from a property manager near the I-64 east/SR 199 ramp and in Surry County. Total parking costs for two large events currently are estimated at \$417,600.

Table 9.6 Estimated Parking Costs

		District Sports Complex	Eastern State Hospital	Colonial Williamsburg	Busch Gardens Water Country	Leased I-64 East	Leased Surry County	Total
	Spaces	1,200	3,000	2,000	2,000	2,000	1,000	
	Soil Stabilization	22,000	22,000					\$44,000
	Lighting	2,000	2,000			2,400	1,200	7,600
	Fencing/Barriers	6,200	6,200	6,200	6,200	6,200	6,200	37,200
Security	Number	8	8	10	8	10	6	
	Cost	6,200	6,200	8,000	6,200	8,000	4,700	39,300
Attendants	Number	8	8	10	8	10	6	
	Cost	3,400	3,400	4,000	3,400	4,000	2,500	20,700
Lease	Per space					25	10	
	Total					50,000	10,000	60,000
TOTAL (Per Events)								\$208,800
TOTAL (Two Events)								\$417,600

9.3.3 Large-Event Bus Operations

The 2007 large-event bus operations will require personnel to control the flow of buses and people and the interaction between them at all pick-up/drop-off locations. Specific responsibilities include bus dispatching, traffic and visitor control, and supervision at both the individual parking lots and at a central dispatching area. The central dispatching area could be part of a larger central command post where emergency, security, and logistics functions are centralized. Table 9.7 presents the daily staffing requirements for large events and cost estimates for two event days. The total staffing costs for the two large events totals \$95,110.

Table 9.7 Jamestown 2007 Shuttle Bus Services*
Estimated Daily Staffing Needs and Associated Costs for Large Events

	Hours per Person			Total People	Total Hours	Hourly Wage	Total Wages
	A.M.	P.M.	Total				
North Park-and-Ride Lots – Assumes Open at 6:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility for North Lots	6	10	16	1	16	\$35	\$560
Traffic Control – Directs Cars on Public Roads	6	10	16	8	128	50	6,400
Traffic Control – Directs Cars INSIDE Lot	6	3	9	8	72	20	1,440
Bus Dispatcher – Directs Bus Movements	6	3	9	1	9	30	270
Customer Service – Directs People To/From Buses	6	3	9	8	72	25	1,800
Subtotal				26	297		\$10,470
South Park-and-Ride Lots – Assumes Open at 6:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility for South Lots	6	10	16	1	16	\$35	\$560
Traffic Control – Directs Cars on Public Roads	6	10	16	8	128	50	6,400
Traffic Control – Directs Cars INSIDE Lot	6	3	9	8	72	20	1,440
Bus Dispatcher – Directs Bus Movements	6	3	9	1	9	30	270
Customer Service – Directs People To/From Buses	6	3	9	8	72	25	1,800
Subtotal				26	297		\$10,470
Hotel Shuttles (Route 60 N and S) – Assumes Open at 8:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility for Hotel Shuttles	4	10	14	1	14	\$35	\$490
Bus Dispatcher – Directs Bus Movements	4	10	14	1	14	30	420
Customer Service – Directs People To/From Buses at Key Stops	4	10	14	6	84	25	2,100
Subtotal				8	112		\$3,010
Colonial Williamsburg (Bypass Route) – Assumes Open at 8:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility at CW	4	10	14	1	14	\$35	\$490
Bus Dispatcher – Directs Bus Movements	4	10	14	1	14	30	420
Customer Service – Directs People To/From Buses	4	10	14	6	84	25	2,100
Subtotal				8	112		\$3,010
Jamestown Departures – Assumes Open at 7:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility at Jamestown	5	10	15	1	15	\$35	\$525
Bus Dispatcher – Directs Bus Movements	5	10	15	1	15	30	450
Traffic Control – Assists Dispatcher with Bus Movements	5	10	15	4	60	25	1,500
Crowd Control – Assists with Flow of Crowd to Loading Area	-	8	8	6	48	25	1,200
Customer Service – Directs People To/From Buses	5	10	15	12	180	25	4,500
Subtotal				24	318		\$8,175
Scotland Ferry Shuttles – Assumes Open at 8:00 a.m. and Close at 10:00 p.m.							
Supervisor – Overall Responsibility at CW	4	10	14	1	14	\$35	\$490
Traffic Control – Assists Dispatcher with Bus Movements	5	10	15	4	60	25	1,500
Bus Dispatcher – Directs Bus Movements	4	10	14	1	14	30	420
Customer Service – Directs People To/From Buses	4	10	14	6	84	25	2,100
Subtotal				12	174		\$4,510
Williamsburg Transportation Center Shuttle							
Supervisor – Overall Responsibility	4	10	14	1	14	\$35	\$490
Traffic Control – Assists Dispatcher with Bus Movements	4	10	14	1	14	25	350
Bus Dispatcher – Directs Bus Movements	4	10	14	1	14	30	420
Customer Service – Directs People To/From Buses	4	10	14	1	14	25	350
Subtotal				4	54		\$1,610
Dispatch Center – Assumes Open at 5:00 a.m. and Close at 11:00 p.m.							
Bus Operations Director – Overall Responsibility for Shuttle System	7	11	18	1	18	\$55	\$990
Bus Dispatchers – Monitor/Troubleshoot Shuttle Services	7	11	18	3	54	35	1,890
Field Supervisors – Respond to Situations in the Field	7	11	18	4	72	35	2,520
Support Staff – Provide Assistance as Needed in Dispatch Center	7	11	18	2	36	25	900
Subtotal				10	180		\$6,300
TOTAL				118	1,544		\$47,555
TOTAL (Two Events)							\$95,110

*This table reflects estimated labor only - costs associated with communications system, facilities, buses, etc., are not included.

9.3.4 Large-Event Bus Leasing Costs

We have revised our estimate of bus needs for a large event to 244 buses, assuming an average occupancy of 45 persons per bus. These costs all assume a flat leasing rate of \$65 per hour, which is a reasonable standard for a private charter. Public-sector providers, such as Hampton Roads Transit, may be able to provide buses and operators at somewhat reduced rates. Charter buses from Richmond and Norfolk are assumed to be provided by the private sector and are not included in the cost estimate.

The Phase I report included cost estimates for the purchase of buses, for the Hotel shuttle, and for the Jamestown to Colonial Williamsburg route. Williamsburg Area Transit and the National Park Service is considering the purchase or leasing of buses for the U.S. 60 and Colonial Williamsburg to Jamestown routes respectively. These routes would begin service before 2007 and continue beyond 2007. Operating costs for these services are estimated to total \$357,240, as shown in Table 9.8. Capital costs are described in Section 9.5, under Yearlong/Small Events.

9.3.5 Traffic Management

The Jamestown 2007 large events will require traffic management to guide traffic on U.S. 60, maintain a smooth flow of traffic on SR 199, and maintain bus-only operations on the Colonial Parkway. Additionally, variable message signs and static “wayfinding” signs will assist visitors to navigate to their destinations in and to the Historic Triangle area. Traffic cones will be placed at critical locations near the venues and on U.S. 60 to channel traffic. Estimate costs for large-event traffic management and operations are estimated at \$147,270.

Table 9.8 Estimated Costs for Large-Event Jamestown 2007 Shuttle Bus Service – 45-Passenger Maximum Capacity

Selected Measures	Maximum Loads		Totals
	One Way to Jamestown	One Way to Park-and-Ride	
	7:00 a.m.-7:00 p.m.	7:30 a.m.-7:30 p.m.	
Satellite Park-and-Ride Shuttle South			
Vehicles in Service	20	20	40
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200
Satellite Park-and-Ride Shuttle North			
Vehicles in Service	15	15	30
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$11,700	\$11,700	\$23,400
Hotel Shuttle South			
Vehicles in Service	20	20	40
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200
Hotel Shuttle North			
Vehicles in Service	22	22	44
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$17,160	\$17,160	\$34,320
Hotel Shuttle Bypass Road			
Vehicles in Service	20	20	40
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$15,600	\$15,600	\$31,200
Colonial Williamsburg/Jamestown Shuttle			
Vehicles in Service			10
Estimated Cost per Vehicle in Service	\$780	\$780	\$780
Total Estimated Cost	\$3,900	\$3,900	\$7,800
Scotland Ferry Shuttle			
Vehicles in Service			30
Estimated Cost per Vehicle in Service	\$195	\$195	\$380
Total Estimated Cost	\$5,850	\$5,850	\$11,700
Williamsburg Transportation Center Shuttle			
Vehicles in Service	5	5	10
Estimated Cost per Vehicle in Service	\$390	\$390	\$780
Total Estimated Cost	\$3,900	\$3,900	\$7,800
TOTAL VEHICLES IN SERVICE			244
TOTAL ESTIMATED COST			\$178,620
TOTAL ESTIMATED COST (Two Events)			\$357,240

Table 9.9 Estimated Costs for Large-Event Traffic Management and Operations

Item	Quantity	Unit Cost	Total
Portable Message Signs	20	\$1,335/Week	\$26,700
Static Signs 36x36	15	200/Piece	3,000
Static Signs 48x48	15	245/Piece	3,675
Static Signs 48x60	15	320/Piece	4,800
Sign Posts	45	175/Piece	7,875
Traffic Cones	150	0.40/Week	60
Police Assistance	24	500/Event	12,000
Logo Decals	45	60/Piece	2,700
Security	50	450/Event	22,500
TOTAL			\$83,310
TOTAL (Two Events)			\$147,270

Note: Assumes static signs and signposts will be reused.

A summary of transportation costs for major events is shown on Table 9.10 below. The total is estimated at \$1,200,650.

**Table 9.10 Estimated Costs for Jamestown 2007 Transportation System:
Two Major Events**

Service	Description	Estimated Costs
Amtrak Rail Service	12 Trips Daily: Richmond - Newport News	\$155,300
Ferry Service	Increased Frequency: Surry County - Jamestown	28,130
Bus Lease	All Routes	357,240
Bus Operations	Dispatch Personnel and Supervisors	95,110
Parking (Including Security)	Leasing	417,600
Traffic Operations (Including Security)	Signs	147,270
TOTAL (Two Events)		\$1,200,650

■ 9.4 Mid-Sized Events

The Jamestown 2007 Events Subcommittee has tentatively planned a series of monthly special events, each with a particular theme, such as Black History or religious freedom. Some of these special events may attract a sufficient number of visitors to warrant additional parking near the Settlement/Island venues. The Phase I report described a traffic management scheme that would direct traffic away from critical intersections in Williamsburg and Jamestown, in order to maintain traffic flow for residents, workers, students, and other visitors in the Historic Triangle area. This section describes our revised cost estimates for these mid-sized events, which we define as those attracting between 4,000 and 13,000 persons.

9.4.1 Parking

The Phase I plan calls for the leasing of roughly 2,000 parking spaces as close to the event venues as possible. The report suggested that Mainland Farm as an appropriate site for such parking, and supplied cost estimates for the excavation and replacement of the productive soil on the site for temporary parking. James City County officials have indicted that these remediation measures may be insufficient and that any disturbance of the soil may permanently harm the farm's productivity. For this reason, new parking options must be considered.

A potential private/public partnership may resolve the issues of nearby parking for Jamestown 2007. A consortium of construction firms called the Jamestown 2007 Corridor Constructors has offered to design and construct the SR 359 and SR 199 roadway and intersection improvements, in return for the permission to operate a for-fee parking lot near the Jamestown Settlement.

The revised cost estimates assume that an alternative to Mainland Farm site can be found, and that such parking spaces would be leased to the entity responsible for managing Jamestown 2007 transportation services. Estimated costs are \$60,000, as shown in Table 9.11 below.

Table 9.11 Estimated Parking Costs for Mid-Sized Events

Parking Needs	Unit Cost	Estimated Costs
2,000 Spaces for Six Events	\$5.00 per Space	\$60,000

9.4.2 Mid-Sized Event Bus Operations

For an event attracting 4,000 to 13,000 persons, three separate bus services are envisioned: 1) A slightly enhanced “Relax-and-Ride” bus, which would operate at much lower frequencies than the hotel shuttles recommended for the large events; 2) A Colonial Williamsburg-Jamestown shuttle, which would operate throughout the day and at 10- to 15-minute frequencies during peak attendance times and 3) a short-distance shuttle, which would transfer visitors to the venues from parking lots located roughly one-half mile away. Assuming a 25 percent capture rate for transit, and by eliminating the remote lot service from the I-64 lots, bus requirements can be reduced considerably – to approximately 45 buses or fewer. We assume that six mid-sized events will take place during 2007 and that no charter bus services are included. The lease and operations cost for the six events totals \$481,200, or roughly \$80,200 per event.

9.4.3 Traffic Management

The mid-sized events will require on-site traffic management, signage, and traffic police at certain strategic locations, such as SR 31 between SR 359 and SR 199. The costs shown below assume that the static signs purchased for the large events can be re-used for the mid-sized events. Total costs for traffic operations, police/fire support, and bus operations for the six mid-sized events are estimated at \$657,100.

**Table 9.12 Estimated Costs for Jamestown 2007 Transportation System:
Six Mid-Sized Events**

Service	Description	Estimated Capital and Operating Costs
Bus Lease	All Routes	\$410,700
Bus Operations	Dispatching and Supervision	70,500
Parking	Lease	60,000
Traffic Operations	Police/Fire Support	115,900
TOTAL		\$657,100

■ 9.5 Yearlong/Small Events

The Phase I report defined small events as those attracting a relatively small number of visitors, on the order of 4,000 to 5,000. The report recommends a system of static signs for route guidance, a Colonial Parkway shuttle operating at 15-minute (minimum) intervals

between Yorktown, Colonial Williamsburg, and Jamestown, an expanded U.S. 60 “Relax-and-Ride” route, to operate at 10- to 15-minute intervals during peak times and a ferry park-and-ride lot in Surry County.

The expanded service on U.S. 60 and the Yorktown-Jamestown shuttle service are “legacy” projects requiring capital expenditures. The U.S. 60 service, which is operated by Williamsburg Area Transit, would continue to serve the tourism and commuter market and the Colonial Parkway service would serve the tourist travel market. The National Park Service is studying the feasibility of the Parkway service and expects to finish its evaluation in 2003. The Park Service, Williamsburg Area Transit, Colonial Williamsburg, or a private concern are possible operators of this service.

Table 9.13 below presents cost estimates for the yearlong/small events. These estimates include the cost of designing and producing an informational brochure for residents. Also included is the design and implementation of an interactive trip planner. The web-based planner would function very much like an airline reservation service – users key in their intended trip origin, destination, and travel window and the programs presents a listing of bus services that minimize travel time to planned events. A more expanded version of the web service would provide itineraries for additional destinations in Williamsburg and include services covering regional airports.

Table 9.13 Estimated Costs for Jamestown 2007: Yearlong/Small Event Transportation System

Service	Description	Estimated Costs
Bus Operations	Colonial Parkway Services	\$945,600
	Route 60 Services	270,200
Parking	Construction	N/A
	Leasing	N/A
Other	Planning/Coordination	1,000,000
	Brochures (150,000)	200,000
	Web-based Trip Planner	100,000
Subtotal (Operations, Parking, and Other)		\$2,515,800
Bus Purchase	Colonial Parkway Service	
	(ATS Study: Seven Buses)	\$2,415,000
	Route 60 Buses (Two Additional)	580,000
Subtotal (Bus Purchase Only)		\$2,995,000
TOTAL		\$5,510,800

Total costs by event type and expenditure category are shown in Table 9.14.

**Table 9.14 Estimated Costs for Jamestown 2007 Transportation System:
Summary**

Service	Yearlong	Mid-Sized	Major	Total
Bus Lease and Operations	\$1,215,800	\$481,200	\$452,400	\$2,149,400
Ferry Operations			28,100	28,100
Traffic Operations	N/A	115,900	147,300	263,200
Parking	N/A	60,000	417,600	477,600
Planning and Coordination	1,300,000		N/A	1,300,000
Additional Amtrak Service			155,300	155,300
Subtotal (Bus Operations, etc.)	\$2,515,800	\$657,100	\$1,200,700	\$4,373,600
Bus Purchase	2,995,000	N/A	N/A	2,995,000
TOTAL (With Bus Purchase)	\$5,510,800	\$657,100	\$1,200,700	\$7,368,600
TOTAL (Adjusted for 3.5 Percent Annual Inflation)				\$8,169,700

Note: Numbers rounded to nearest 100.

■ 9.6 Potential Funding Sources

In developing an estimate of potential funding sources to support the transportation costs, it is necessary to consider the timeframe over which each type of expenditure would generate benefits and would be implemented, as well as the wide range of potential sources from which revenues might be sought.

In one respect, the financial opportunities associated with the transportation elements could become confusing, because there are many potential sources rather than only one source that could be utilized. For example, the transportation costs represent a small portion of the overall costs, and therefore they could potentially be covered by the most general and flexible sources of potential revenues, such as admission fees, parking fees, or other general revenues associated with Jamestown 2007. In addition, more general transportation revenue sources from the Federal government, the State, or other jurisdictions might also be utilized.

It is critically important that the development of the financing arrangements for these transportation elements not be delayed or subject to uncertainty because of the understandable hope of various stakeholders that someone else could provide some or all of the funding needed. Therefore, preliminary decisions should be made as early as possible on the preferred funding sources to be sought for each element of transportation cost. Then,

if the preferred source for some reason is not available, the responsible parties can cooperatively seek other funding for the transportation elements.

The discussion of funding sources is broken down here in terms of the expenditure types that would be associated with continuing transportation services, and the expenditure types that would be more directly associated with only Jamestown 2007. For those services for which Jamestown 2007 offers an opportunity to initiate or jump-start services that should be continued, consideration might be given to some general sources of support, including capital purchases of new vehicles that will continue in service after Jamestown 2007, and the operating costs of services that will start with Jamestown 2007 but will be very appropriate and beneficial to continue after Jamestown 2007.

9.6.1 Considerations of Timing and of the Continuation of Transit Services After 2007

For some elements, the considerations of timing and continuation of services after 2007 would indicate that particular sources might be appropriate for these needed expenditures although not necessarily for some of the more specialized Jamestown 2007 expenditures. Those transit services that would be continued after Jamestown 2007 is concluded are natural candidates for support as a part of the normal transit systems of the affected jurisdictions. The buses that were suggested for purchase, and their associated operating costs during the celebration, are elements that fall into the category of potentially continuing costs for which support should hopefully be provided in a similar manner as is done for the other transit services that are now provided in this area or in nearby areas.

In the case of these two services, the total of nine buses to be purchased at an estimated bus purchase capital cost of \$2,995,000 are intended to constitute a long-term investment, for which these desirable services would be continued. Thus, while the capital costs of the buses and the portion of the operating costs that would occur during Jamestown 2007 are shown as associated with Jamestown 2007, these investments provide substantial mobility benefits both before and after Jamestown 2007. Under these circumstances, it could be appropriate that some portion of these costs be shared, or that all of these costs be rolled into other regional transit budgets. The Williamsburg Area Transportation Authority is assumed to continue to operate the buses associated with the yearlong and small event transportation system services subsequent to 2007.

Jamestown 2007 and local jurisdictions should consider working cooperatively to generate Federal funding and state matching funding for the capital purchases or for operating support of these initiatives with continuing benefits.

9.6.2 Federal Funding Sources

Federal participation in capital funding for bus purchases could be solicited either through the normal formula programs administered by the Federal Transit Administration (FTA) under Title 49 of the U.S. code, or through a special or “earmarked”

source of dedicated capital funds in the surface transportation reauthorization legislation, which will govern Federal transportation programs from 2004 through 2009, or through an earmark to be included in an annual appropriations bill. Formula Federal aid would have to be received by an eligible recipient and would have to be matched with other funds, normally at a ratio of 80 percent Federal and 20 percent matching funds. Earmarked funds would require the same match, and would be channeled to come through a specific Federal funding program for which the type of expenditure was eligible.

Earmarks may not increase a state's actual allocation of Federal aid, and so it can be the case that the state's entire Congressional delegation may not favor a specific earmark. However, earmarks are utilized by Congress to assure that the targeted high-priority investments are made from the available totals of Federal aid resources.

9.6.3 Funding Sources Associated More Directly with Jamestown 2007

For the higher patronage events – either major or mid-sized – there will be incremental costs of bus leases and operations that will not be associated with services to be provided after 2007. These special event needs will thus not normally be associated with continuing funding from current operating entities.

Other than these elements, the needed transportation expenditures associated with Jamestown 2007 are mostly particular to the commemoration period itself, even though some will have continued “intangible” benefits for the local area.

These other types of expenditures are more appropriate elements for which funding sources might be sought that have a more direct relationship to the events themselves.

9.6.4 Portions of General Admission Revenues or Other General Revenues

The general admission fees or other general revenues are anticipated to provide a very substantial sum of total revenues to offset the costs of Jamestown 2007. In order to cover the non-planning, non-capital costs associated with transportation services provided for 2007, which totals approximately \$4.0 million, and assuming that 1.0 million persons will visit Jamestown Settlement or Jamestown Island during 2007, a fee of \$4.00 per person as a portion of an admission fee would cover transportation costs. This fee could be covered through general admission revenues.

9.6.5 Parking Fees

Those who attend special events or special sites are accustomed to paying parking fees as well as admission fees. Parking fees could be charged to cover either just the incremental cost of parking for the major events, or to cover the costs of all transportation events.